Pioneer *sound.vision.soul*

Service Manual

FORD

FH-2077ZF/X1H/UC

ORDER NO.
CRT2822

RECEIVER ASSY RADIO

FH-2077ZF X1H/UC
FH-2177ZF X1H/UC

COMPACT disc DIGITAL AUDIO

VEHICLE	PRODUCED AFTER	FORD PART No.	ID No.	PIONEER MODEL No.
FORD RANGER	2002	2L54-18C868-AB	–	FH-2077ZF/X1H/UC
FORD SPORT TRUCK	2002	2L2T-18C868-AA	–	FH-2177ZF/X1H/UC

● **This service manual should be used together with the following manual(s):**

Model No.	Order No.	Mech. Module	Remarks
CX-597	CRT1829	S7	CD Mech. Module:Circuit Description, Mech. Description, Disassembly
CX-1011	CRT2406	3L	Cassette Mech. Module:Mech. Description, Disassembly

NOTE:

● **Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.**

For details, refer to "Important symbols for good services".

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS (USA) INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER EUROPE NV Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

© **PIONEER CORPORATION 2002**

K-ZZU. JAN. 2002 Printed in Japan

CONTENTS

1. SAFETY INFORMATION 3
2. EXPLODED VIEWS AND PARTS LIST 4
3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM ..10
4. PCB CONNECTION DIAGRAM 38
5. ELECTRICAL PARTS LIST 54
6. ADJUSTMENT 66
7. GENERAL INFORMATION 76
7.1 DIAGNOSIS.....76
7.1.1 DISASSEMBLY 76
7.1.2 CONNECTOR FUNCTION DESCRIPTION ..78
7.1.3 PCB LOCATION 79
7.2 PARTS.....80
7.2.1 IC 80
7.2.2 DISPLAY 85
7.3 OPERATION FLOW CHART.....86
7.4 CLEANING 87
8. OPERATIONS AND SPECIFICATIONS 88

[Important symbols for good services]
In this manual, the symbols shown-below indicate that adjustments, settings or cleaning should be made securely.
When you find the procedures bearing any of the symbols, be sure to fulfill them:

1. Product safety

You should conform to the regulations governing the product (safety, radio and noise, and other regulations), and should keep the safety during servicing by following the safety instructions described in this manual.

2. Adjustments

To keep the original performances of the product, optimum adjustments or specification confirmation is indispensable. In accordance with the procedures or instructions described in this manual, adjustments should be performed.

3. Cleaning

For optical pickups, tape-deck heads, lenses and mirrors used in projection monitors, and other parts requiring cleaning, proper cleaning should be performed to restore their performances.

4. Shipping mode and shipping screws

To protect the product from damages or failures that may be caused during transit, the shipping mode should be set or the shipping screws should be installed before shipping out in accordance with this manual, if necessary.

5. Lubricants, glues, and replacement parts

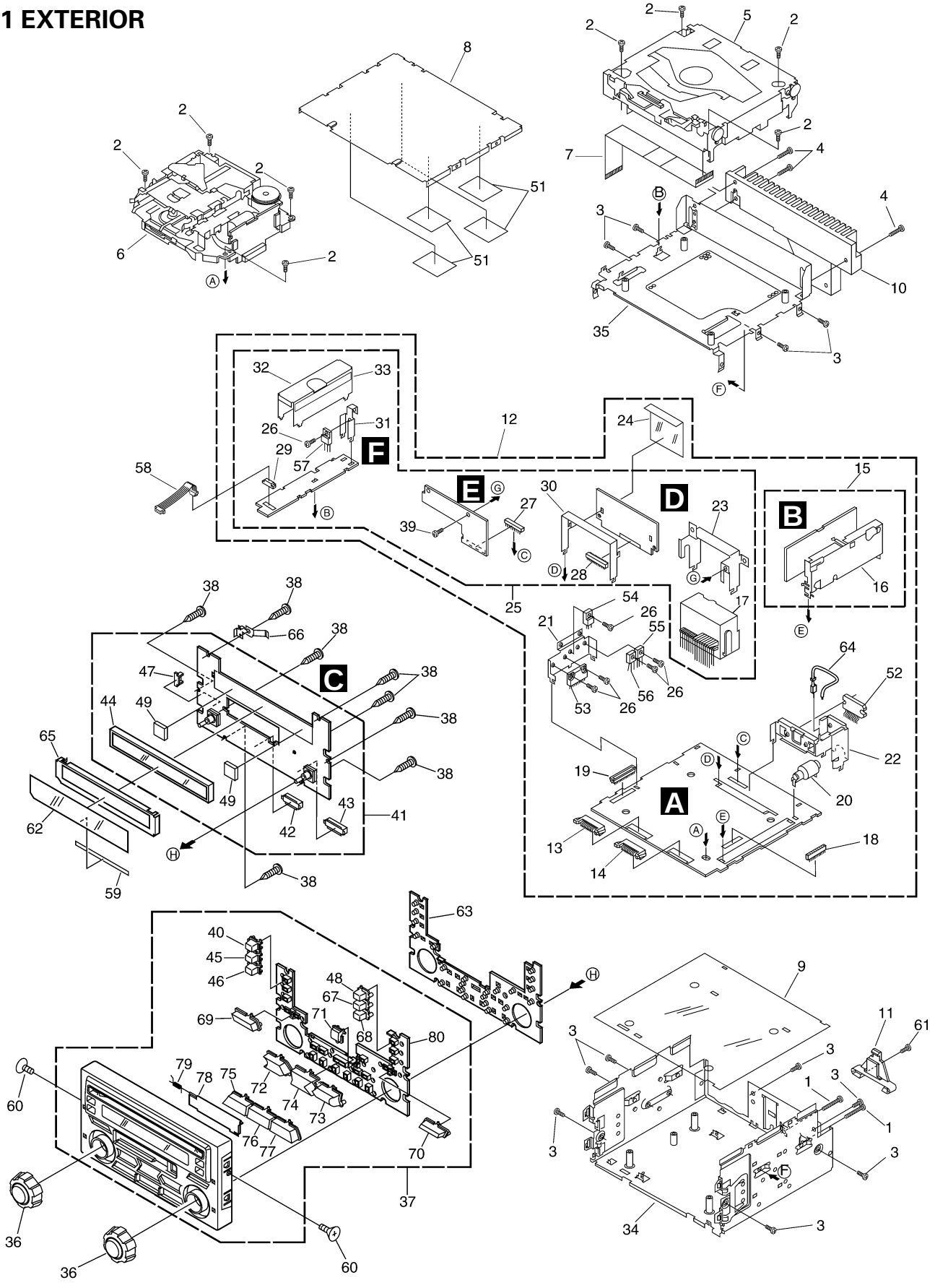
Appropriately applying grease or glue can maintain the product performances. But improper lubrication or applying glue may lead to failures or troubles in the product. By following the instructions in this manual, be sure to apply the prescribed grease or glue to proper portions by the appropriate amount.For replacement parts or tools, the prescribed ones should be used.

1. SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty.
If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

2. EXPLODED VIEWS AND PARTS LIST

2.1 EXTERIOR



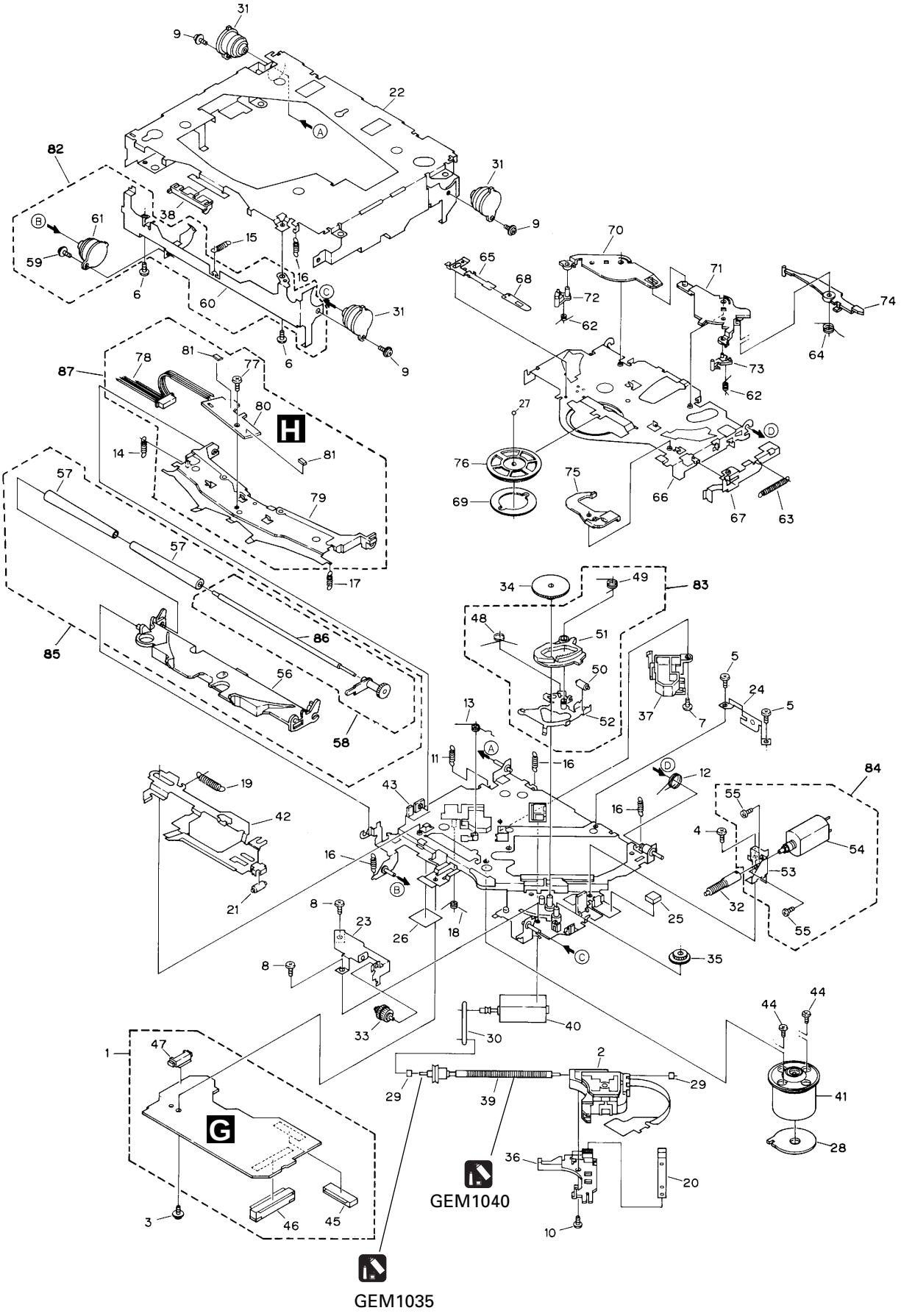
NOTE:

- Parts marked by "*"are generally unavailable because they are not in our Master Spare Parts List.
- Screws adjacent to ▼ mark on the product are used for disassembly.
- For the applying amount of lubricants or glue, follow the instructions in this manual.
  (In the case of no amount instructions, apply as you think it appropriate.)

● EXTERIOR SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Screw	BMZ26P250FMC
	2	Screw	BSZ26P050FMC
	3	Screw	BSZ30P050FMC
	4	Screw	BSZ30P120FMC
	5	CD Mechanism Module(S7F VA)	CXK5028
	6	Cassette Mechanism Module	EXK4260
	7	Connector	CDE5462
	8	Case	HNB2059
	9	Insulator	HNM0089
	10	Heat Sink	HNR1418
	11	Rail Guide	HNV4897
	12	Mother Unit(FH-2077ZF)	HWM0072
		Mother Unit(FH-2177ZF)	HWM0081
	13	Plug (CN952)	CKS3537
	14	Plug (CN953)	CKS3538
	15	Tuner Unit	CWE1428
	16	Holder	CNC6122
	17	Connector (CN901)	HKM1237
	18	Connector (CN702)	CKS3568
	19	Connector (CN701)	HKS2256
	20	Antenna (CN402)	HKX1054
	21	Holder	HNC6458
	22	Holder	HNC6459
	23	Holder	HNC6470
*	24	Insulator	HNM5228
	25	Compound Unit(FH-2077ZF)	HWM0074
		Compound Unit(FH-2177ZF)	HWM0082
	26	Screw	BMZ26P060FMC
	27	Plug (CN1001)	CKS1621
	28	Plug (CN201)	CKS1622
	29	Connector(CN1051)	HKS3129
*	30	Holder	HNC6457
	31	Holder	HNC6650
	32	Shield	HNC6930
*	33	Insulator	HNM5229
	34	Chassis Unit	HXA8841
	35	Chassis Unit	HXA8842
	36	Knob Assy	CXB8377
	37	Grille Unit	CXB9218
	38	Screw	BPZ26P080FMC
	39	Screw	BSZ30P050FMC
	40	Button(EJ)	CAC7446
	41	Keyboard Unit	HWM8124
	42	Socket (CN958)	CKS3550
	43	Socket (CN957)	CKS3551
	44	VF	HAW1359
	45	Button(AM)	CAC7447
	46	Button(FM)	CAC7448
	47	Connector (CN954)	HKS3129
	48	Button(MUTE)	CAC7449
	49	Spacer	HNM4761
	50	Shield	HNC7337
*	51	Insulator	HNM5230
	52	IC(IC301)	TDA7560
	53	IC(IC802)	PA2024A
	54	Transistor (Q618)	2SD2396
	55	Transistor (Q803)	2SA1358
	56	Transistor (Q805)	2SA1358
	57	Transistor (Q1054)	2SD2396
	58	Cord	HDE5049
	59	Tape	CNM5582
	60	Screw	HBA1416
	61	Screw	HBA1404
	62	Sheet	CNM5480
	63	Rubber	HNV4541
*	64	Cord	CDE5451
	65	Shield	CNC9768
	66	Cushion	CNC9769
	67	Button(TAPE)	CAC7450
	68	Button(CD)	CAC7451
	69	Button(AUTO,RDS)	CAC7452
	70	Button(TUNE)	CAC7453
	71	Button(EJ)	CAC7454
	72	Button(BASS,TREB)	CAC7455
	73	Button(BAL,FADE)	CAC7456
	74	Button(SEL)	CAC7457
	75	Button(1,2)	CAC7458
	76	Button(3,4)	CAC7459
	77	Button(5,6)	CAC7460
	78	Door	CAT2339
*	79	Spring	HBH1920
	80	Housing	CNV7032

2.2 CD MECHANISM MODULE

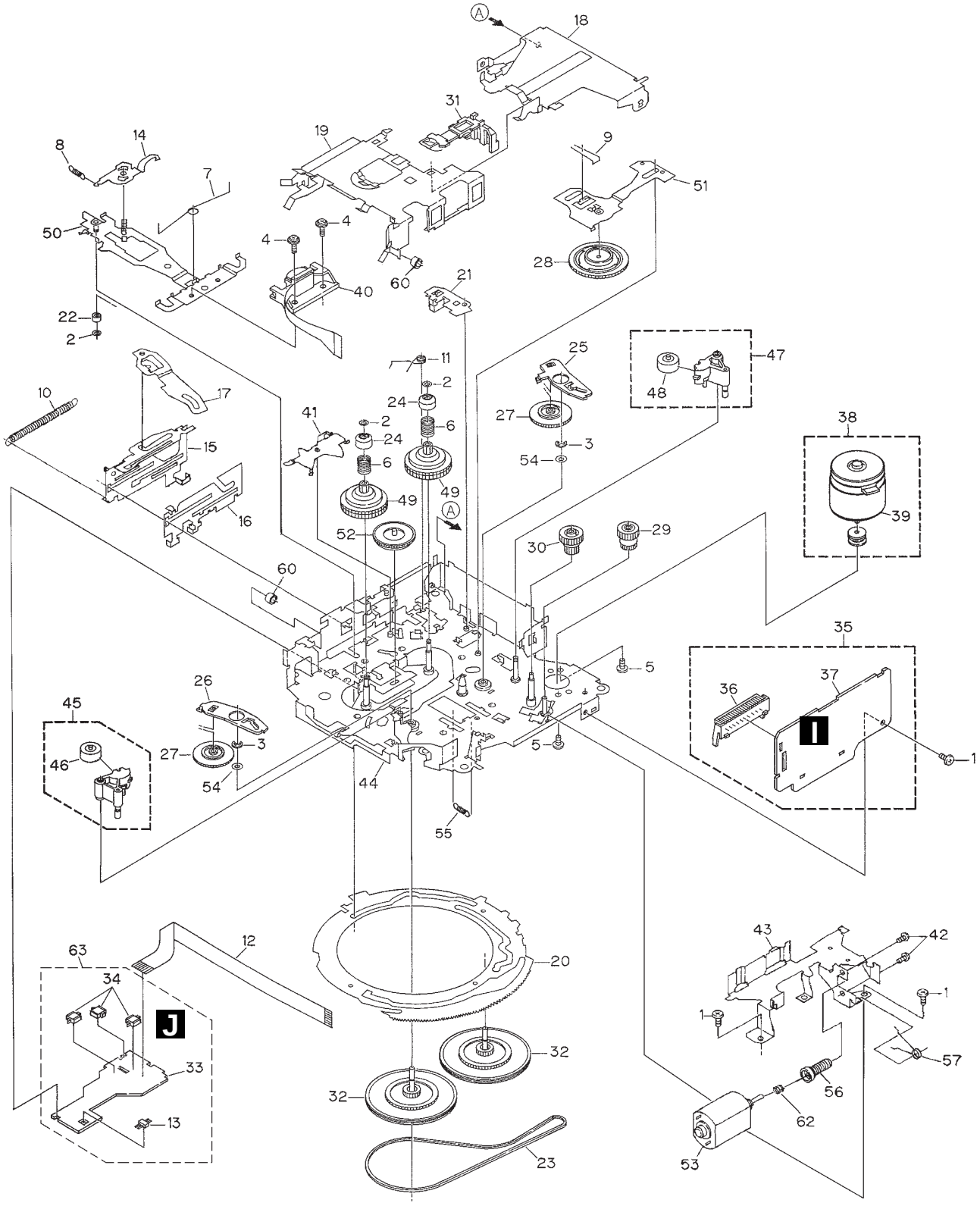


● CD MECHANISM MODULE SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Control Unit	CWX2249
	2	Pickup Unit (Service)	CXX1232
	3	Screw	IMS26P035FMC
	4	Screw	BMZ20P025FMC
	5	Screw	BMZ20P040FMC
	6	Screw	BSZ20P040FMC
	7	Screw (M2x3)	CBA1077
	8	Screw (M2x2)	CBA1250
	9	Screw (M2x5)	CBA1399
	10	Screw (M2x3.85)	CBA1362
	11	Spring	CBH1724
	12	Spring	CBH1729
	13	Spring	CBH1730
	14	Spring	CBH1731
	15	Spring	CBH2348
	16	Spring	CBH1745
	17	Spring	CBH1848
	18	Spring	CBH1849
	19	Spring	CBH1939
	20	Spring	CBL1497
	21	Roller	CLA2627
	22	Frame	CNC8365
	23	Bracket	CNC5871
*	24	Bracket	CNC6376
	25	Cushion	CNM3917
	26	Sheet	CNM4873
	27	Ball	CNR1189
	28	P.C.Board	CNP5243
	29	Bearing	CNR1415
	30	Belt	CNT1071
	31	Damper	CNV3974
	32	Gear	CNV5789
	33	Gear	CNV5820
	34	Gear	CNV4857
	35	Gear	CNV5821
	36	Holder	CNV4663
	37	Holder	CNV5071
	38	Guide	CNV5823
	39	Screw Unit	CXB4265
	40	CRG Motor Unit (M2)	CXB3043
	41	Motor Unit (M1)	CXA9101
	42	Lever Unit	CXA9300
	43	Chassis Unit	CXB2574
	44	Screw	JGZ17P025FZK
	45	Connector (CN101)	CKS1953
	46	Connector (CN701)	CKS2775
	47	Connector (CN801)	CKS2196
	48	Spring	CBH1832
	49	Spring	CBH1833
	50	Roller	CLA2627
	51	Arm	CNV4136
	52	Arm Unit	CXA8565
	53	Bracket	CNC6056
	54	Load Motor Unit (M3)	CXA8702
	55	Screw	JFZ20P025FMC
	56	Arm	CNV4120
	57	Roller	CNV4509
	58	Gear Unit	CXA8701
	59	Screw (M2x5)	CBA1399/
	60	Frame	CNC6844
	61	Damper	CNV3974
	62	Spring	CBH1736
	63	Spring	CBH1863
	64	Spring	CBH1945
	65	Spring	CBL1326
	66	Arm	CNC8364
	67	Lever	CNC6054
	68	Spacer	CNM3315
	69	Sheet	CNM6412
	70	Arm	CNV5031
	71	Arm	CNV4123
	72	Arm	CNV4124
	73	Arm	CNV4125
	74	Arm	CNV4138
	75	Arm	CNV5032
	76	Clamper	CNV5912
	77	Screw (M2x2)	CBA1250
	78	Connector	CDE4576
	79	Arm	CNC7383
*	80	Gathering P.C.Board	CNX2445
	81	Photo-transistor (Q1, 2)	CPT-230S-X
	82	Frame Assy	CXB1068
	83	Elbo Arm Assy	CXA8889
	84	Load Motor Assy	CXA8891
	85	LO Arm Assy	CXA8892
	86	Shaft	CLA3133
	87	Guide Arm Assy	CXB1850

2.3 CASSETTE MECHANISM MODULE

For grease application, refer to the service manual for CX-1011 (CRT2406).



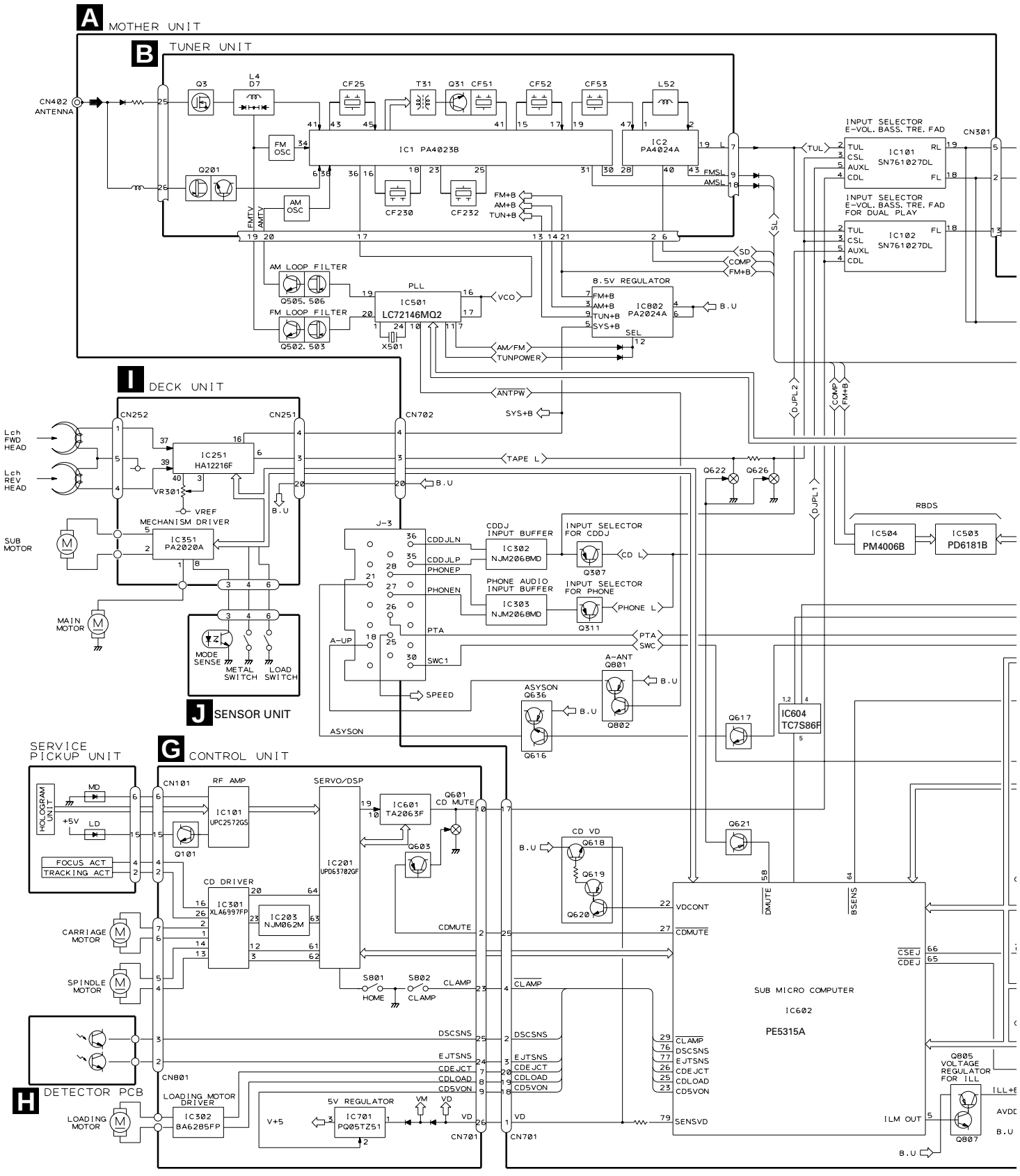
● CASSETTE MECHANISM MODULE PARTS LIST

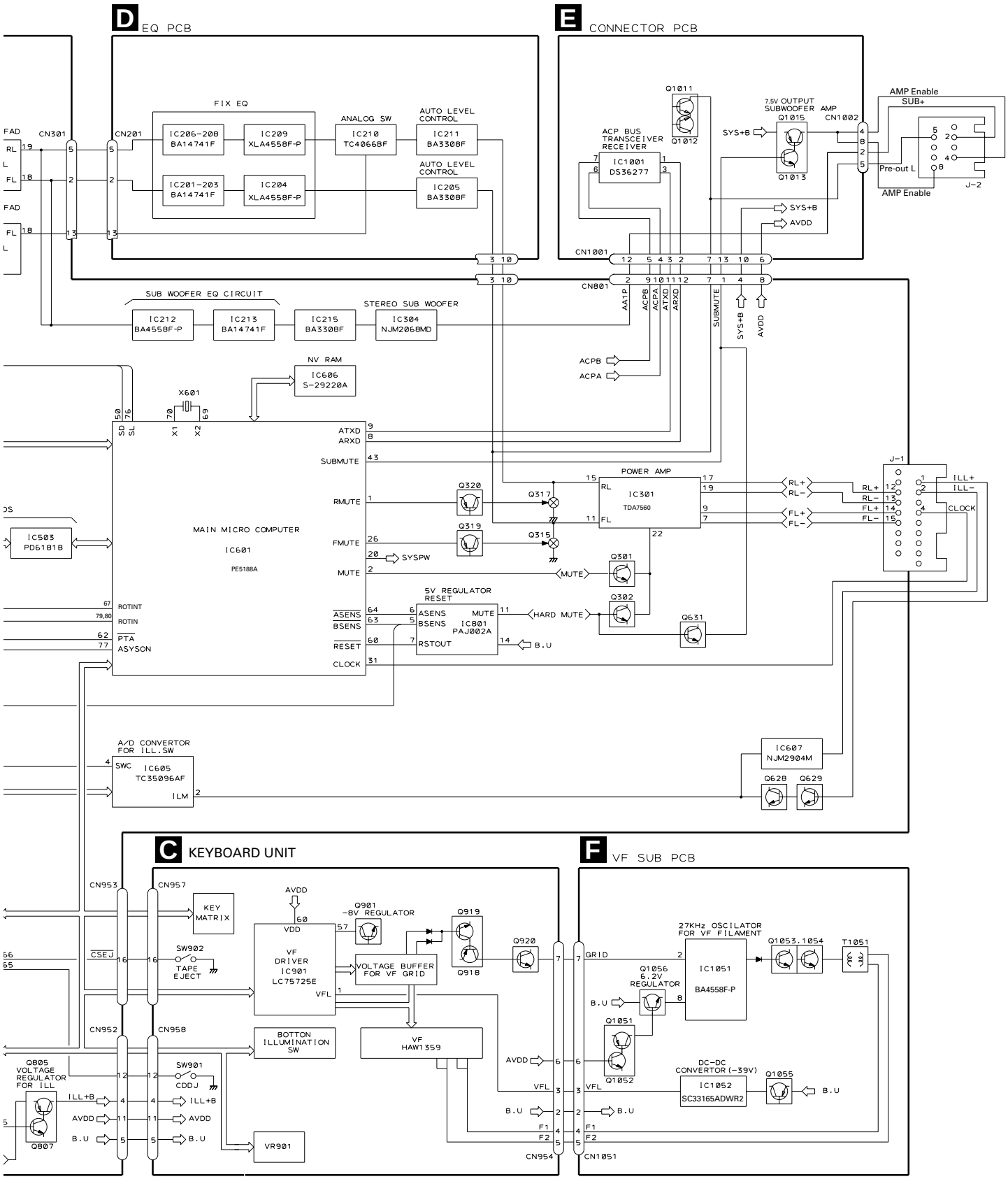
Mark	No.	Description	Part No.
	1	Screw	BSZ20P040FMC
	2	Washer	CBF1037
	3	Washer	CBG1003
	4	Screw	EBA1028
	5	Screw	CBA1037
	6	Spring	EBH1653
	7	Spring	EBH1642
	8	Spring	EBH1641
	9	Spring	EBH1626
	10	Spring	EBH1627
	11	Spring	EBH1648
	12	Cord	EDD1024
	13	Photo-reflector(Q101)	EGN1004
	14	Arm	ENC1526
*	15	Lever	ENC1544
	16	Lever	ENC1543
	17	Arm	ENC1532
	18	Frame	ENC1533
	19	Holder	ENC1547
	20	Gear	ENC1535
	21	Arm	ENC1550
	22	Roller	ENR1040
	23	Belt	ENT1027
	24	Collar	ENV1508
	25	Arm	ENV1539
	26	Arm	ENV1540
	27	Gear	ENV1569
	28	Gear	ENV1547
	29	Gear	ENR1044
	30	Worm Wheel	ENV1559
	31	Lever	ENV1551
	32	Flywheel	ENV1554
	33	PCB	ENP1196
	34	Switch(S101,S102,S103)	ESG1007
	35	Deck Unit	EWM1031
	36	Plug(CN251)	CKS3540
	37	Gathering PCB	ENX1066
	38	Motor Unit(M1)	EXA1491
	39	Motor	EXM1028
	40	Head Assy(HD1)	EXA1594

Mark	No.	Description	Part No.
	41	Arm	ENC1537
	42	Screw	JGZ20P025FNI
	43	Guide	ENC1545
	44	Chassis Unit	EXA1609
	45	Pinch Holder Unit	EXA1608
	46	Pinch Roller	ENV1518
	47	Pinch Holder Unit	EXA1607
	48	Pinch Roller	ENV1518
	49	Reel Unit	EXA1625
	50	Head Base Unit	EXA1611
	51	Lever Unit	EXA1587
	52	Gear Unit	EXA1596
	53	Motor Unit(M2)	EXA1623
	54	Washer	HBF-179
	55	Spring	EBH1537
	56	Worm Gear	ENV1564
	57	Spring	EBH1654
	58	•••••	
	59	•••••	
	60	Tube	ENM1039
	61	•••••	
	62	Spring	EBH1545
	63	Sensor Unit	EWM1036

3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

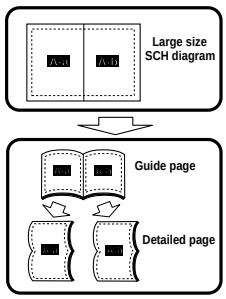
3.1 BLOCK DIAGRAM




D EQ PCB
E CONNECTOR PCB
FIX EQ
IC206-208 BA14741F
IC209 XLA4558F-P
IC201-203 BA14741F
IC204 XLA4558F-P
ANALOG SW
IC210 TC4066BF
AUTO LEVEL CONTROL
IC211 BA3308F
IC205 BA3308F
CN301
CN201
SUB WOOFER EQ CIRCUIT
IC212 BA4558F-P
IC213 BA14741F
IC215 BA3308F
STEREO SUB WOOFER
IC304 NJM2068MD
Q1011
Q1012
ACP BUS TRANSCEIVER RECEIVER
IC1001 DS36277
7.5V OUTPUT SUBWOOFER AMP
Q1015
Q1013
CN1002
AMP Enable
SUB+
Pre-out L
J-2
SYS+B
AVDD
CN1001
CN801
AA1P
ACPB
ACPA
ATXD
ARXD
SUBMUTE
NV RAM
IC606 S-29220A
X601
MAIN MICRO COMPUTER
IC601
PE5188A
IC503 PD61818
POWER AMP
IC301 TDA7560
Q320
Q317
Q319
Q315
Q301
Q302
Q631
5V REGULATOR RESET
IC801 PAJ002A
HARD MUTE
B.U
SYSPW
MUTE
RMUTE
FMUTE
ROTINT
ROTIN
PTA
ASYSON
CLOCK
J-1
ILL+
ILL-
A/D CONVERTOR FOR ILL.SW
IC605 TC35096AF
SWC
ILM
IC607 NJM2904M
Q628
Q629
C KEYBOARD UNIT
F VF SUB PCB
CN953
CN957
CN952
CN958
KEY MATRIX
SW902
TAPE EJECT
CSEJ
VF DRIVER IC901 LC75725E
VDD
VFL
Q901 -8V REGULATOR
VOLTAGE BUFFER FOR VF GRID
Q919
Q918
Q920
BOTTON ILLUMINATION SW
VF HAW1359
SW901
CDDJ
Q805 VOLTAGE REGULATOR FOR ILL
Q807
VR901
CN954
27KHz OSCILATOR FOR VF FILAMENT
IC1051 BA4558F-P
Q1053,1054
T1051
Q1056 6.2V REGULATOR
Q1051
Q1052
DC-DC CONVERTOR (-39V)
IC1052 SC33165ADWR2
Q1055
GRID
CN1051

3.2 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".



A-a

TUN501 TUNER UNIT

PLL

RDS MICRO COMPUTER

RBDS

IC601 PE5188A

MAIN MICRO COMPUTER

IC602 PE5315A

SUB MICRO COMPUTER

5V REG

8.5V REG

CN701

CN702

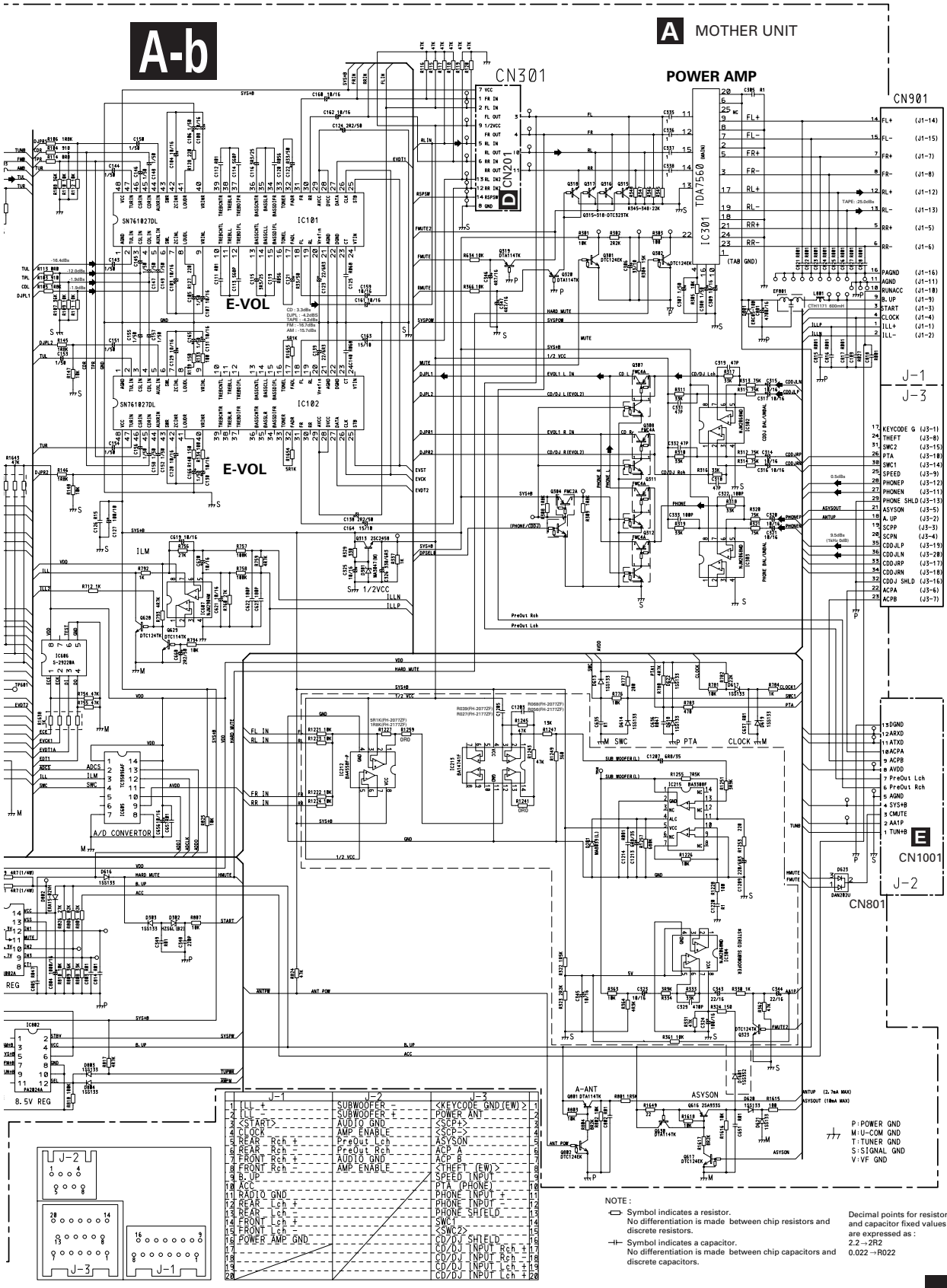
CN251

CN953

CN957

CN952

CN958

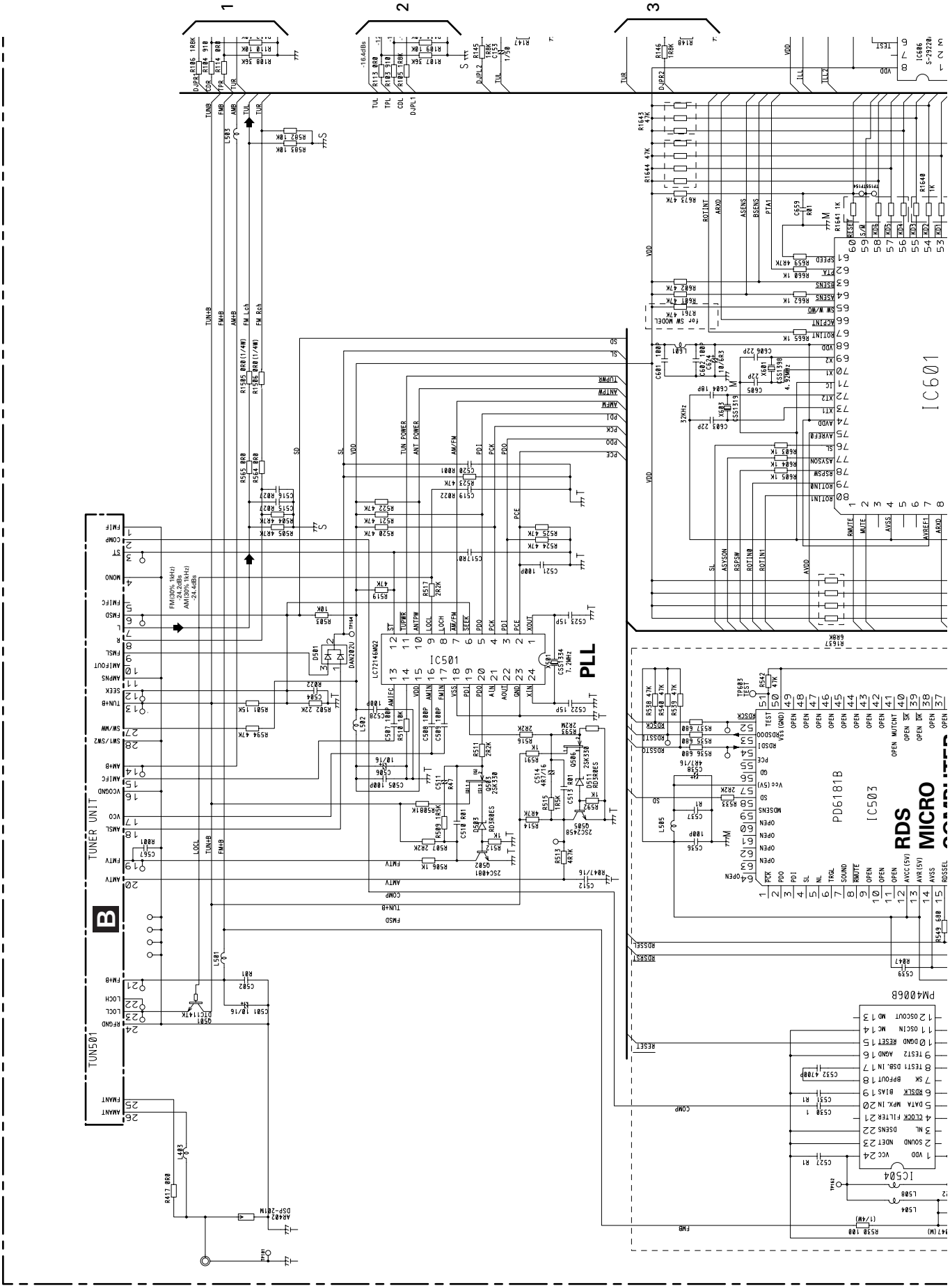


J-1	J-2	J-3	
1	ILL +	SUBWOOFER -	<KEYCODE GND(EW)>	1
2	ILL -	SUBWOOFER +	POWER ANT	2
3	<START>	AUDIO GND	<SCP+>	3
4	CLOCK	AMP ENABLE	<SCP->	4
5	REAR Rch +	PreOut Lch	ASVSON	5
6	REAR Rch -	PreOut Rch	ACP A	6
7	FRONT Rch +	AUDIO GND	ACP B	7
8	FRONT Rch -	AMP ENABLE	<THEFT (EW)>	8
9	B UP		SPEED INPUT	9
10	ACC		PTA (PHONE)	10
11	RADIO GND		PHONE INPUT +	11
12	REAR Lch +		PHONE INPUT -	12
13	REAR Lch -		PHONE SHIELD	13
14	FRONT Lch +		SWC1	14
15	FRONT Lch -		<SWC2>	15
16	POWER AMP GND		CD/DJ SHIELD	16
17			CD/DJ INPUT Rch +	17
18			CD/DJ INPUT Rch -	18
19			CD/DJ INPUT Lch +	19
20			CD/DJ INPUT Lch +	20

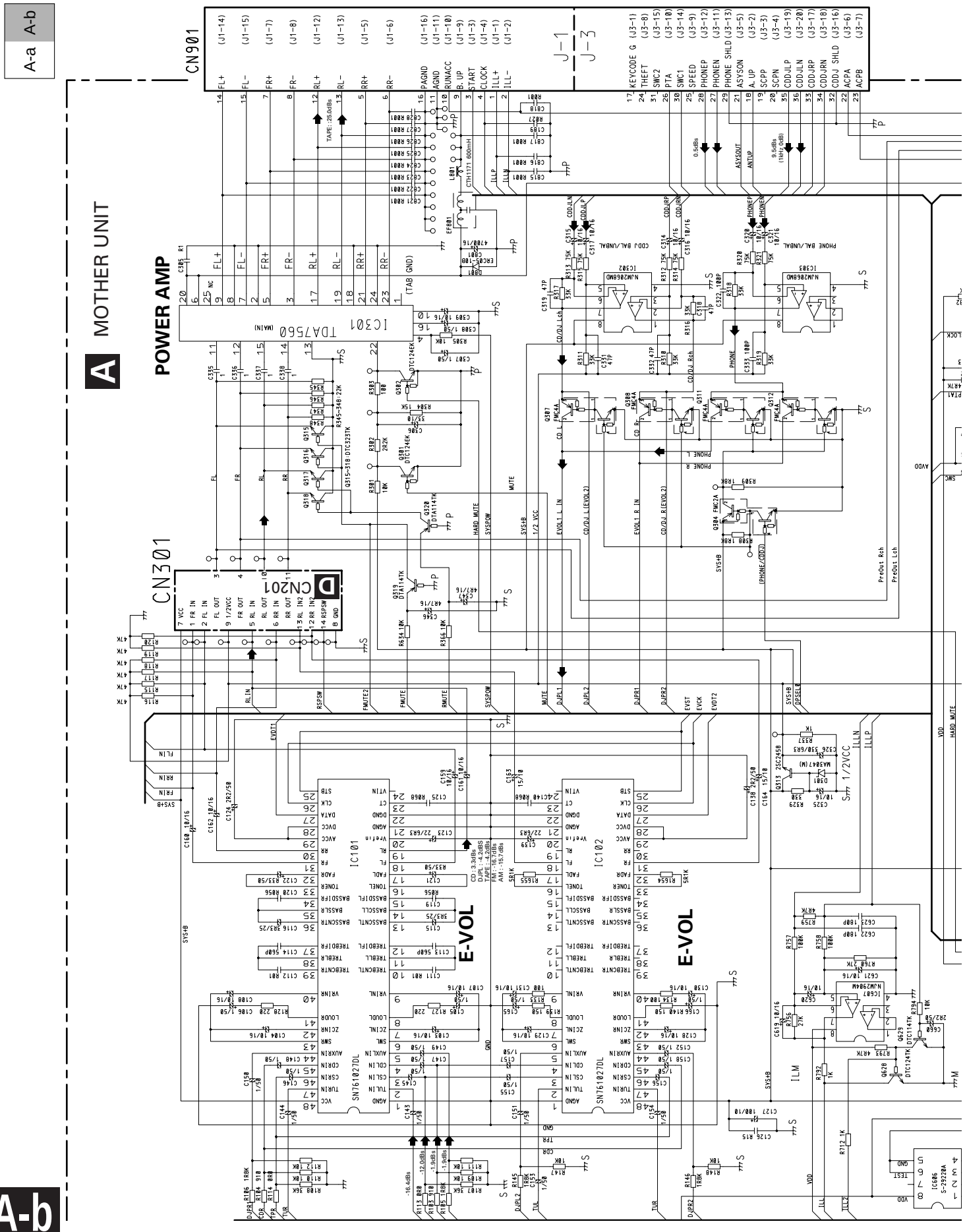
NOTE :

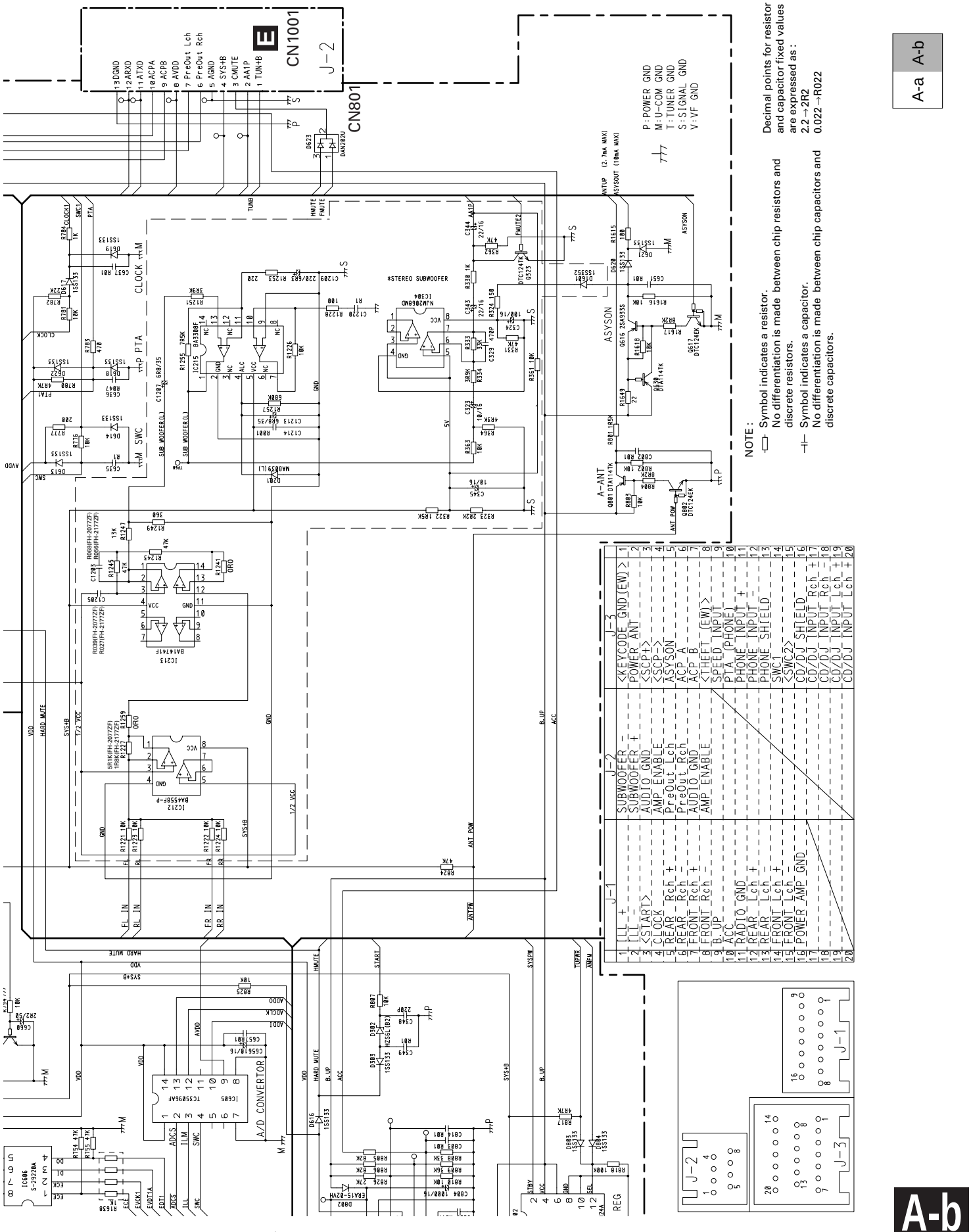
- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as :
2.2→2R2
0.022→R022

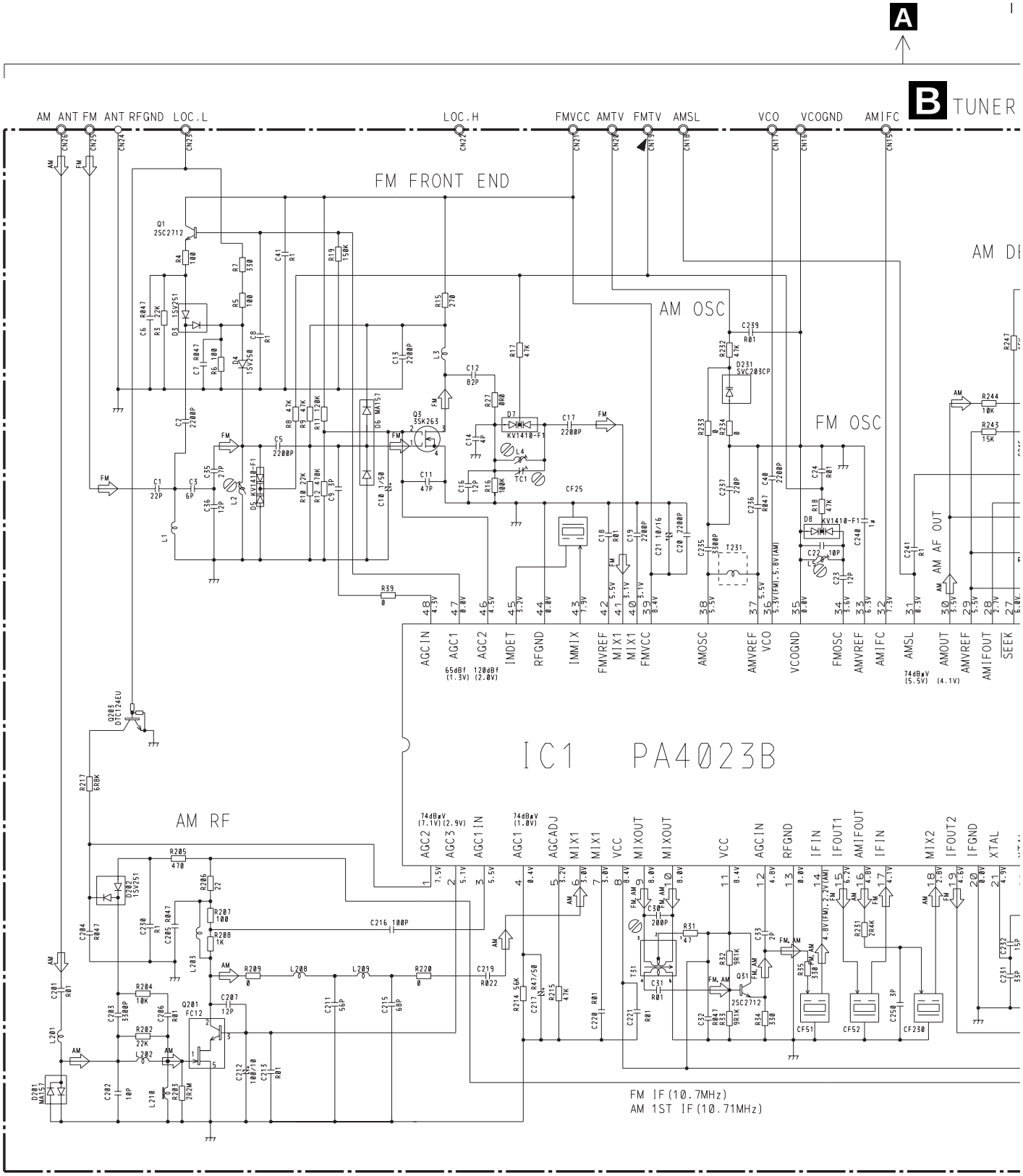

A-b
A-a
A-a
B
TUNER UNIT
TUN501
IC501
PLL
LC72146M02
IC601
IC503
PD6181B
RDS
MICRO
IC504
PM4006B
IC502
PD6181B

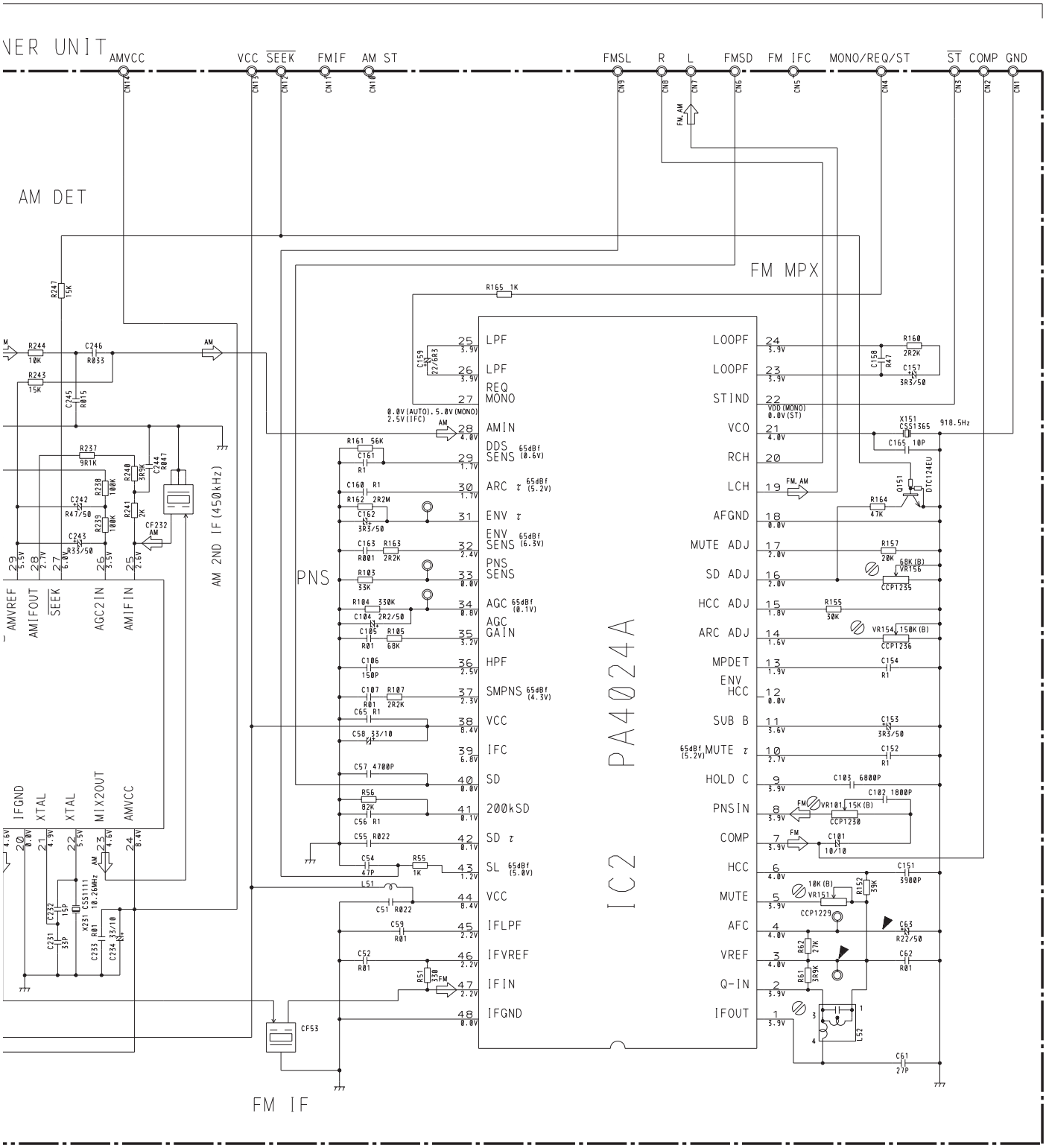
A-a A-b
MAIN MICRO COMPUTER
IC601 PE5188A
SUB MICRO COMPUTER
IC602 PE5315A
RBDS MICRO COMPUTER
RBDS
8.5V REG
5V REG
CN952
CN958
CN957
CN953
CN251
CN702
CN701
A-a


A-a A-b
A MOTHER UNIT
POWER AMP
CN901
CN301
D CN201
IC301
TDA7560 (MAIN)
IC101
IC102
E-VOL
SN761027DL
IC302
NJM2068MD
IC303
NJM2068MD
IC606
S-29230A
IC607
NJM2904M
CD/DJ BAL/UNBAL
PHONE BAL/UNBAL
ILM
A-b

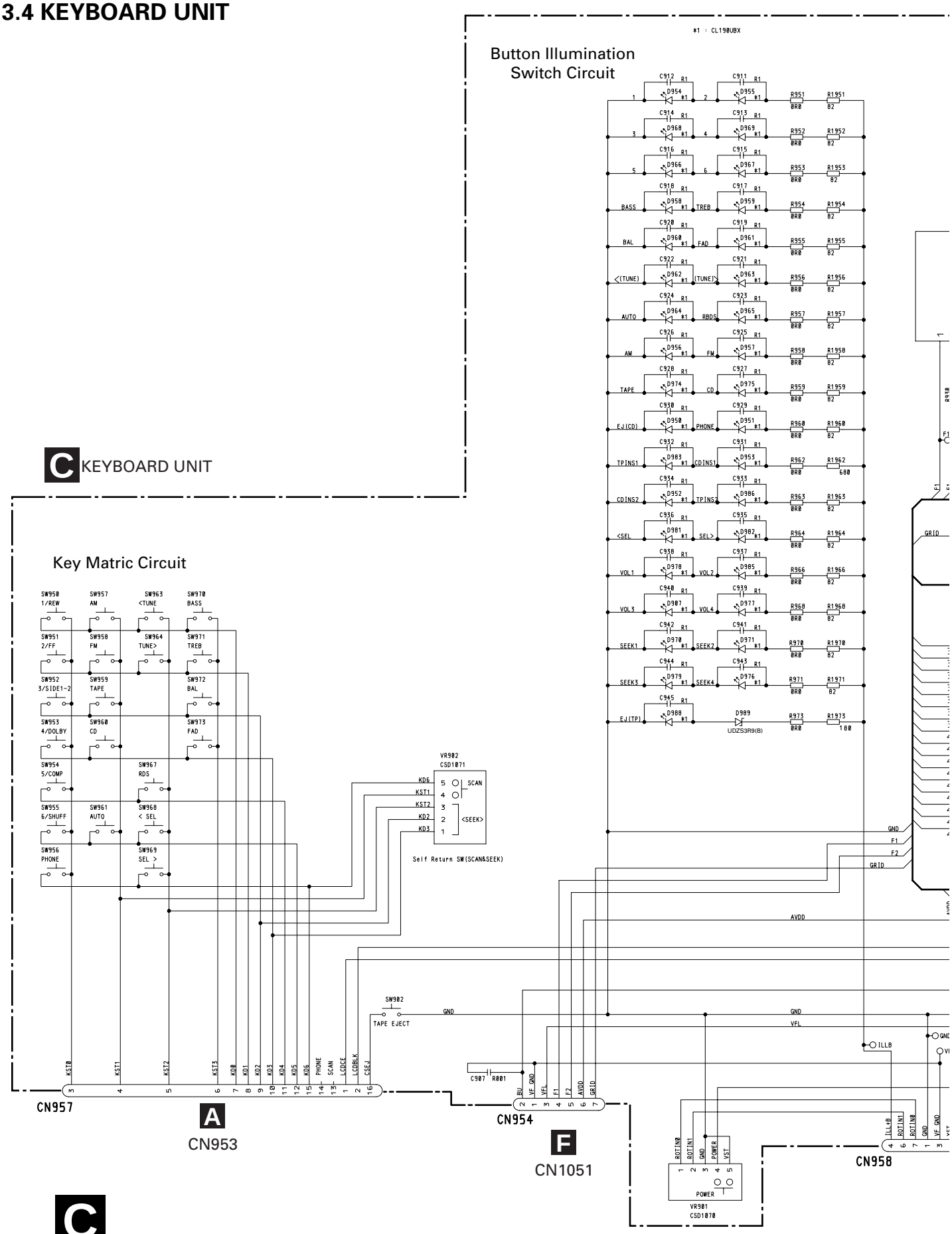

CN1001
CN801
J-2
J-1
J-3
P: POWER GND
M: U-COM GND
T: TUNER GND
S: SIGNAL GND
V: VF GND
NOTE :
Symbol indicates a resistor.
No differentiation is made between chip resistors and discrete resistors.
Symbol indicates a capacitor.
No differentiation is made between chip capacitors and discrete capacitors.
Decimal points for resistor and capacitor fixed values are expressed as :
2.2→2R2
0.022→R022
A-a A-b
*STEREO SUBWOOFER
A/D CONVERTOR
CLOCK
PTA
SWC
ASYSON
A-ANT
REG

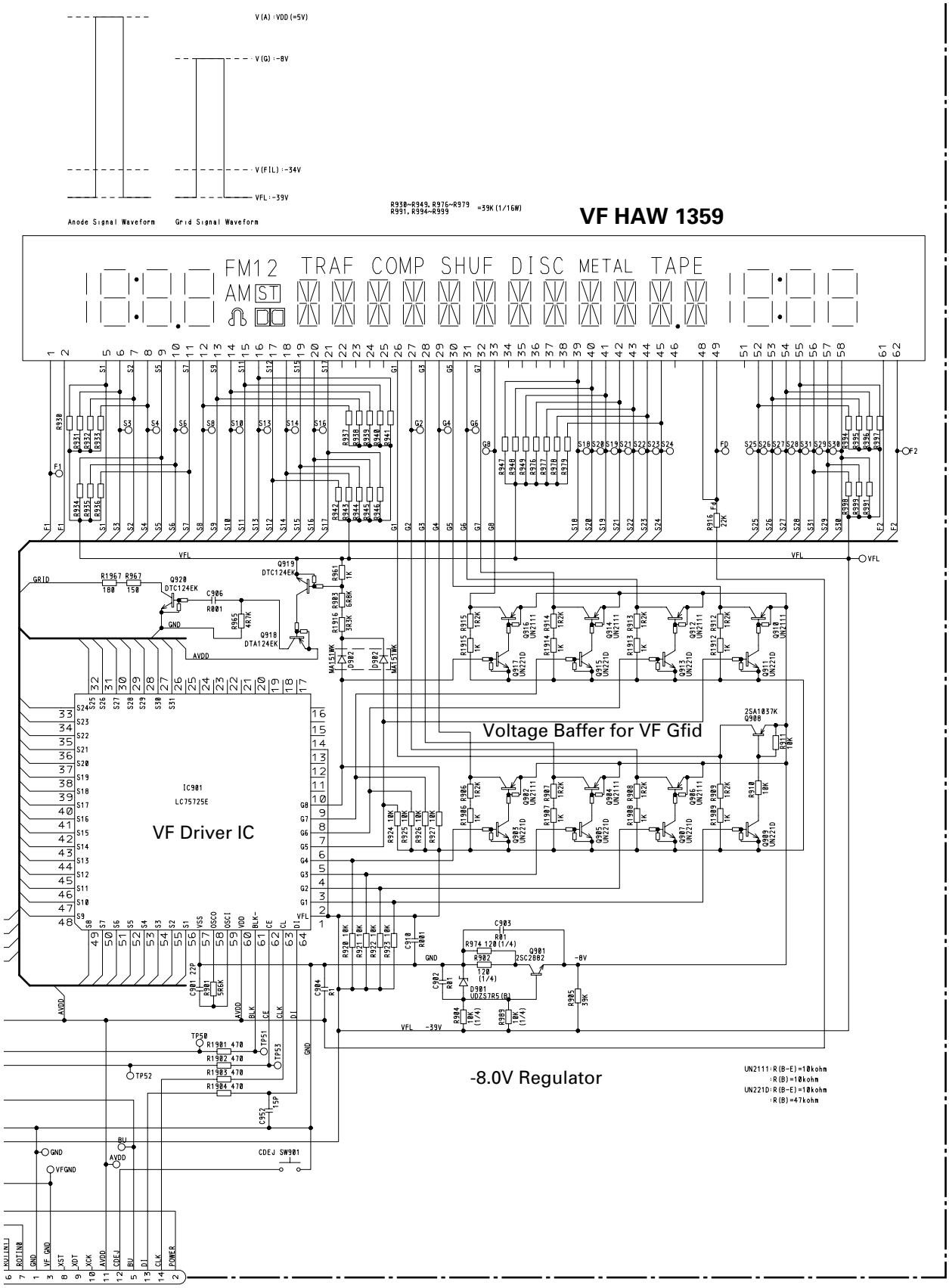
3.3 TUNER UNIT


A
B TUNER
AM ANT FM ANT RFGND LOC.L LOC.H FMVCC AMTV FMTV AMSL VCO VCOGND AMIFC
FM FRONT END
AM OSC
FM OSC
AM AF OUT
IC1 PA4023B
AM RF
AGCIN AGC1 AGC2 IMDET RFGND IMMIX FMVREF MIX1 MIX1 FMVCC AMOSC AMVREF VCO VCOGND FMOSC AMVREF AMIFC AMSL AMOUT AMVREF AMIFOUT SEEK
AGC2 AGC3 AGC1IN AGC1 AGCADJ MIX1 MIX1 VCC MIXOUT MIXOUT VCC AGCIN RFGND IFIN IFOUT1 AMIFOUT IFIN MIX2 IFOUT2 IFGND XTAL
FM IF(10.7MHz)
AM 1ST IF(10.71MHz)

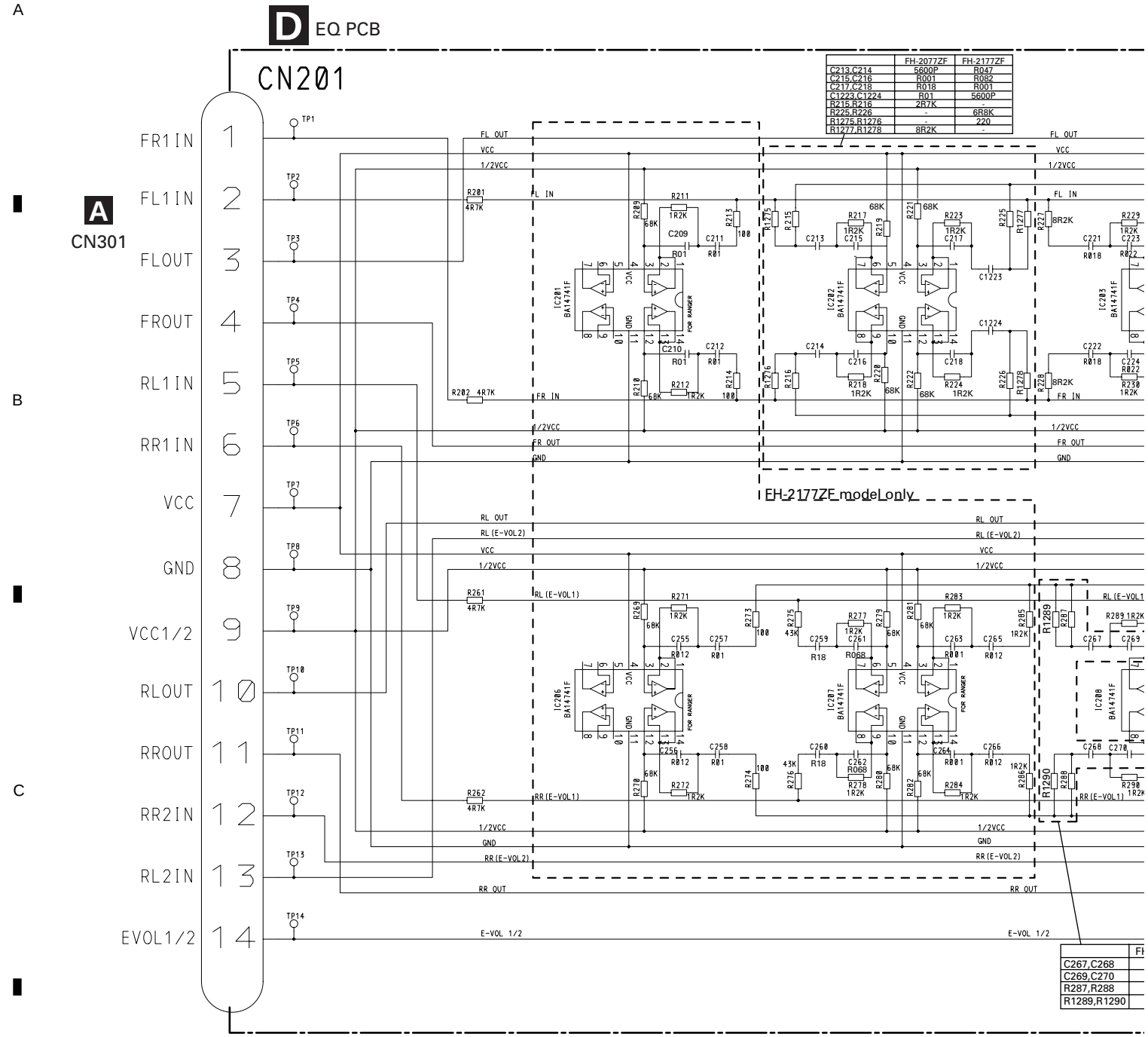

AMP UNIT
AMVCC
VCC
SEEK
FMIF
AM ST
FMSL
R
L
FMSD
FM IFC
MONO/REQ/ST
ST
COMP
GND
AM DET
FM MPX
IC2 PA4024A
PNS
AM 2ND IF (450kHz)
FM IF
LPF
REQ
MONO
AMIN
DDS SENS
ARC τ
ENV τ
ENV SENS
PNS SENS
AGC GAIN
HPF
SMPNS
VCC
IFC
SD
200kSD
SD τ
SL
IFLPF
IFVREF
IFIN
IFGND
LOOPF
STIND
VCO
RCH
LCH
AFGND
MUTE ADJ
SD ADJ
HCC ADJ
ARC ADJ
MPDET
ENV HCC
SUB B
MUTE τ
HOLD C
PNSIN
COMP
HCC
MUTE
AFC
VREF
Q-IN
IFOUT
AMVREF
AMIFOUT
SEEK
AGC2IN
AMIFIN
IFGND
XTAL
XTAL
MIX2OUT
AMVCC
FM_AM
AM
FM
CF232
CF53
X151
X231
LS1
LS2
Q151
VR101
VR151
VR154
VR156
CCP1230
CCP1229
CCP1236
CCP1235
0.0V (AUTO), 5.0V (MONO)
2.5V (IFC)
VDD (MONO)
0.0V (ST)
918.5Hz
65dBf (0.6V)
65dBf (5.2V)
65dBf (6.3V)
65dBf (0.1V)
65dBf (4.3V)
65dBf (5.0V)
65dBf (5.2V)

3.4 KEYBOARD UNIT




V(A) : VDD (=5V)
V(G) : -8V
V(FIL) : -34V
VFL : -39V
Anode Signal Waveform
Grid Signal Waveform
R930~R949, R976~R979, R991, R994~R999 =39K (1/16W)
VF HAW 1359
FM12 TRAF COMP SHUF DISC METAL TAPE
AM ST
Voltage Baffer for VF Gfid
VF Driver IC
IC901
LC75725E
-8.0V Regulator
UN2111 : R(B-E)=10kohm
: R(B)=10kohm
UN221D : R(B-E)=10kohm
: R(B)=47kohm
CN952

3.5 EQ PCB

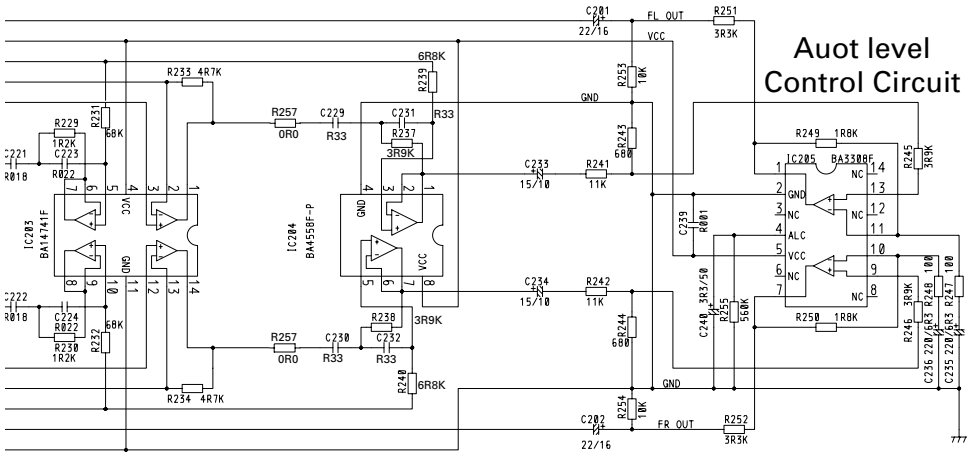


	FH-2077ZF	FH-2177ZF
C213,C214	5600P	R047
C215,C216	R001	R082
C217,C218	R018	R001
C1223,C1224	R01	5600P
R215,R216	2R7K	
R225,R226	-	6R8K
R1275,R1276	-	220
R1277,R1278	8R2K	-

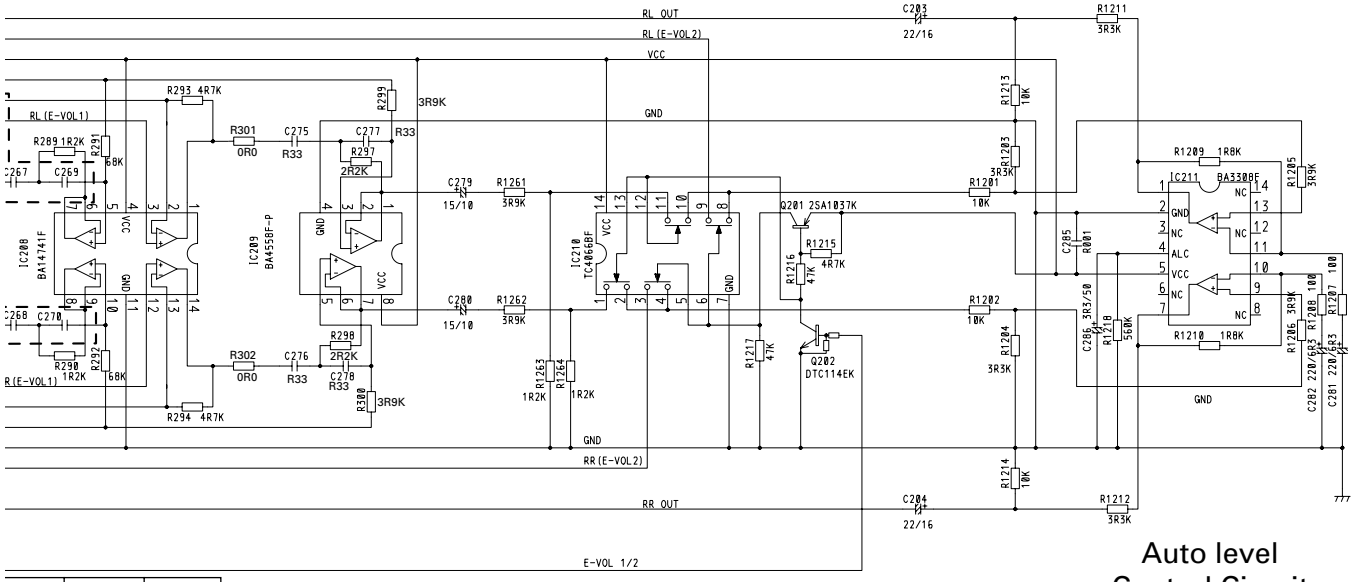
	FH
C267,C268	
C269,C270	
R287,R288	
R1289,R1290	

COMPOUND UNIT
Consists of
EQ PCB
CONNECTOR PCB
VF SUB PCB

Fix EQ Circuit



Auot level Control Circuit

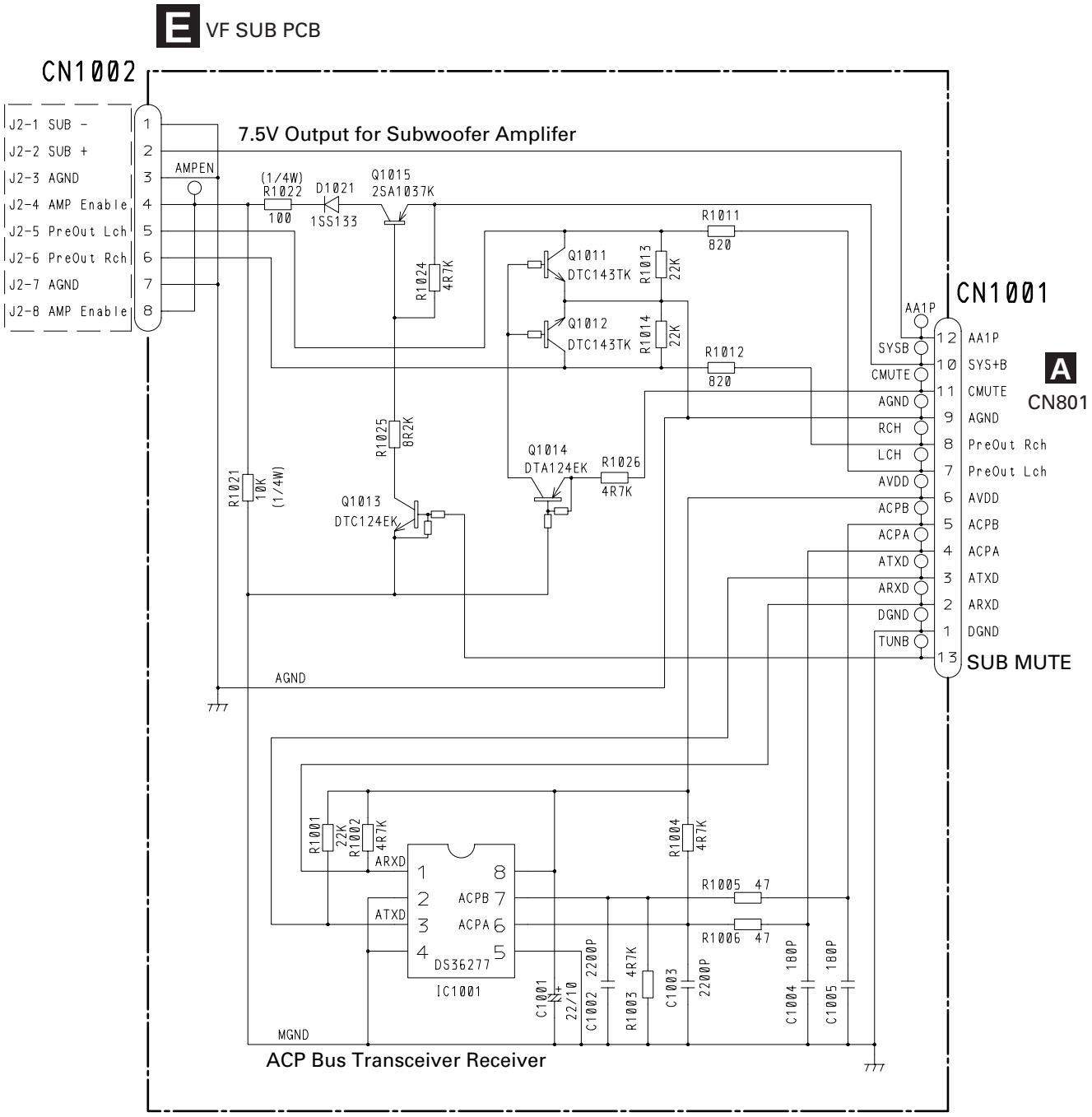


Auto level Control Circuit

Analog Switch for Dual Play

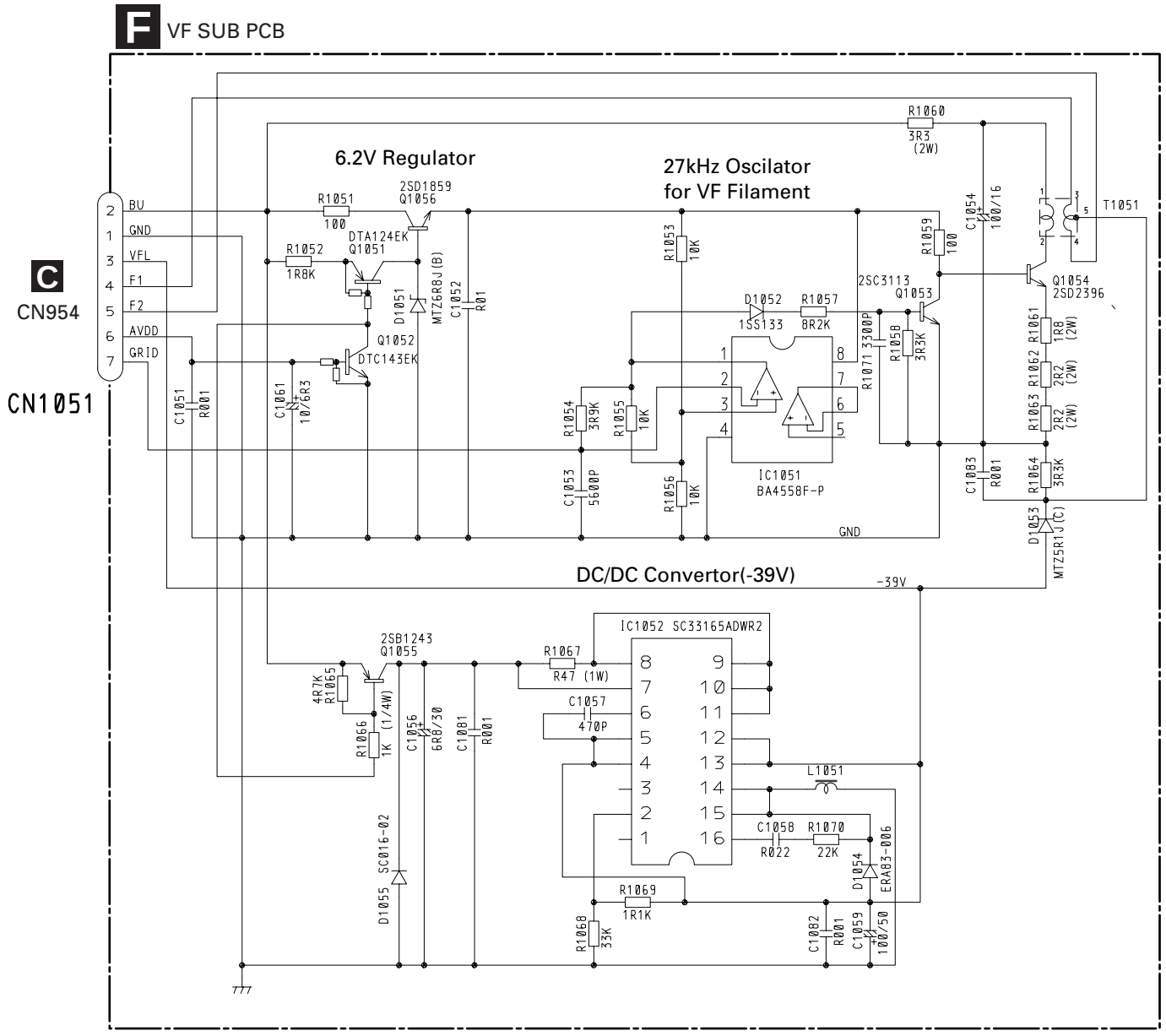
	FH-2077ZF	FH-2177ZF
,C268	R01	R022
,C270	R018	R027
,R288	-	2R7K
9,R1290	0R0	-

3.6 CONNECTOR PCB



COMPOUND UNIT
Consists of
EQ PCB
CONNECTOR PCB
VF SUB PCB

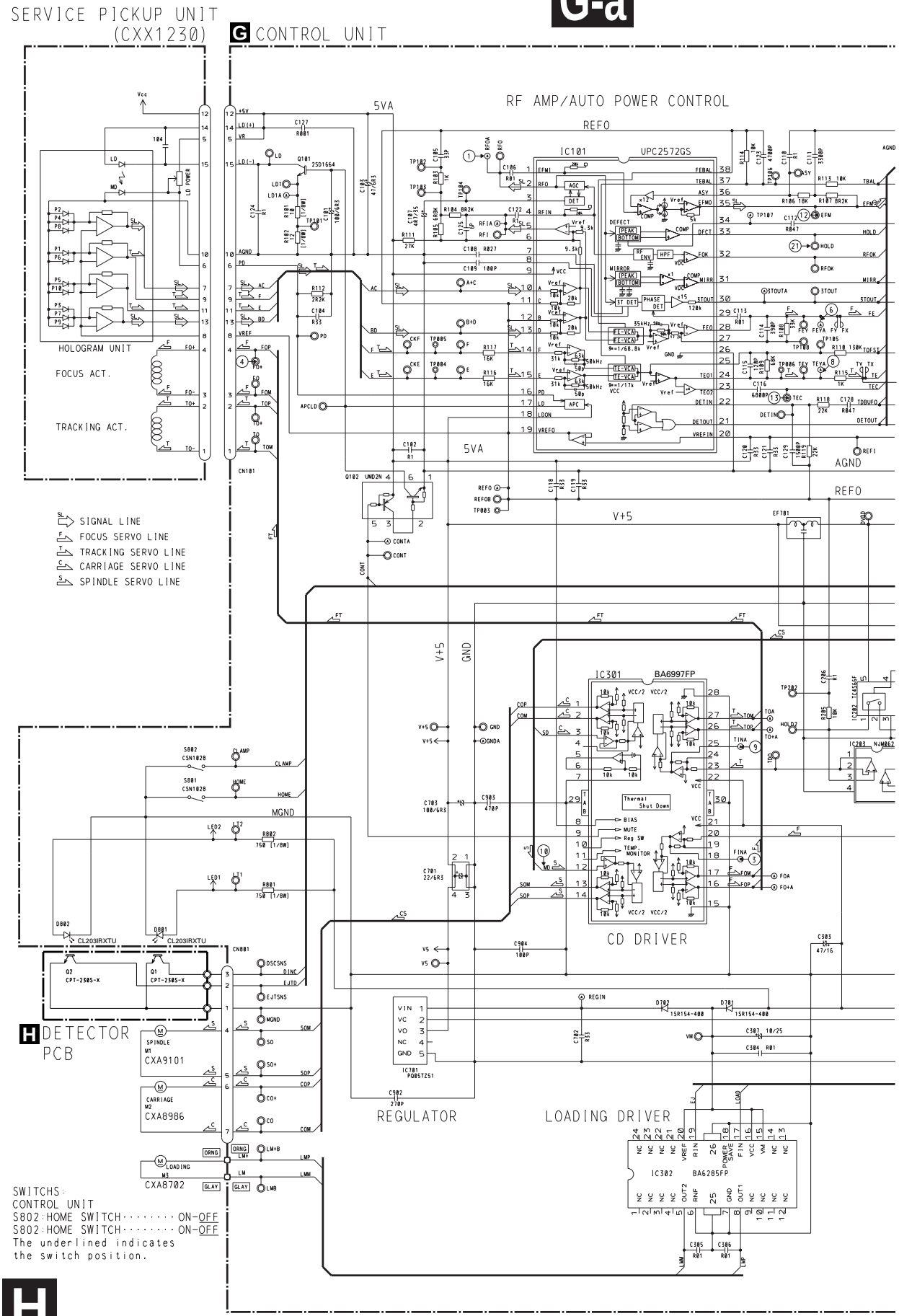
3.7 VF SUB PCB



COMPOUND UNIT
Consists of
EQ PCB
CONNECTOR PCB
VF SUB PCB

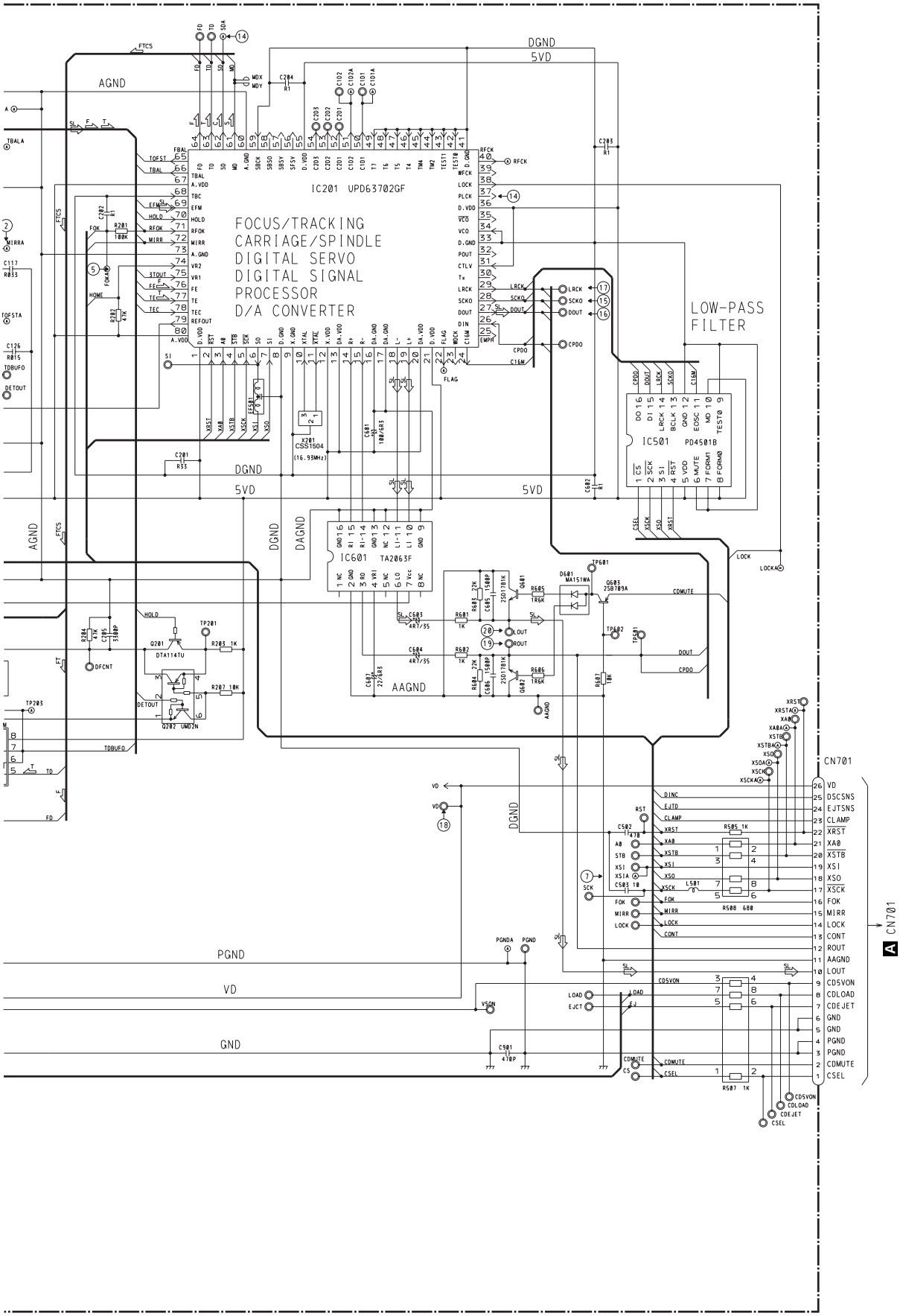
3.8 CD MECHANISM MODULE

G-a

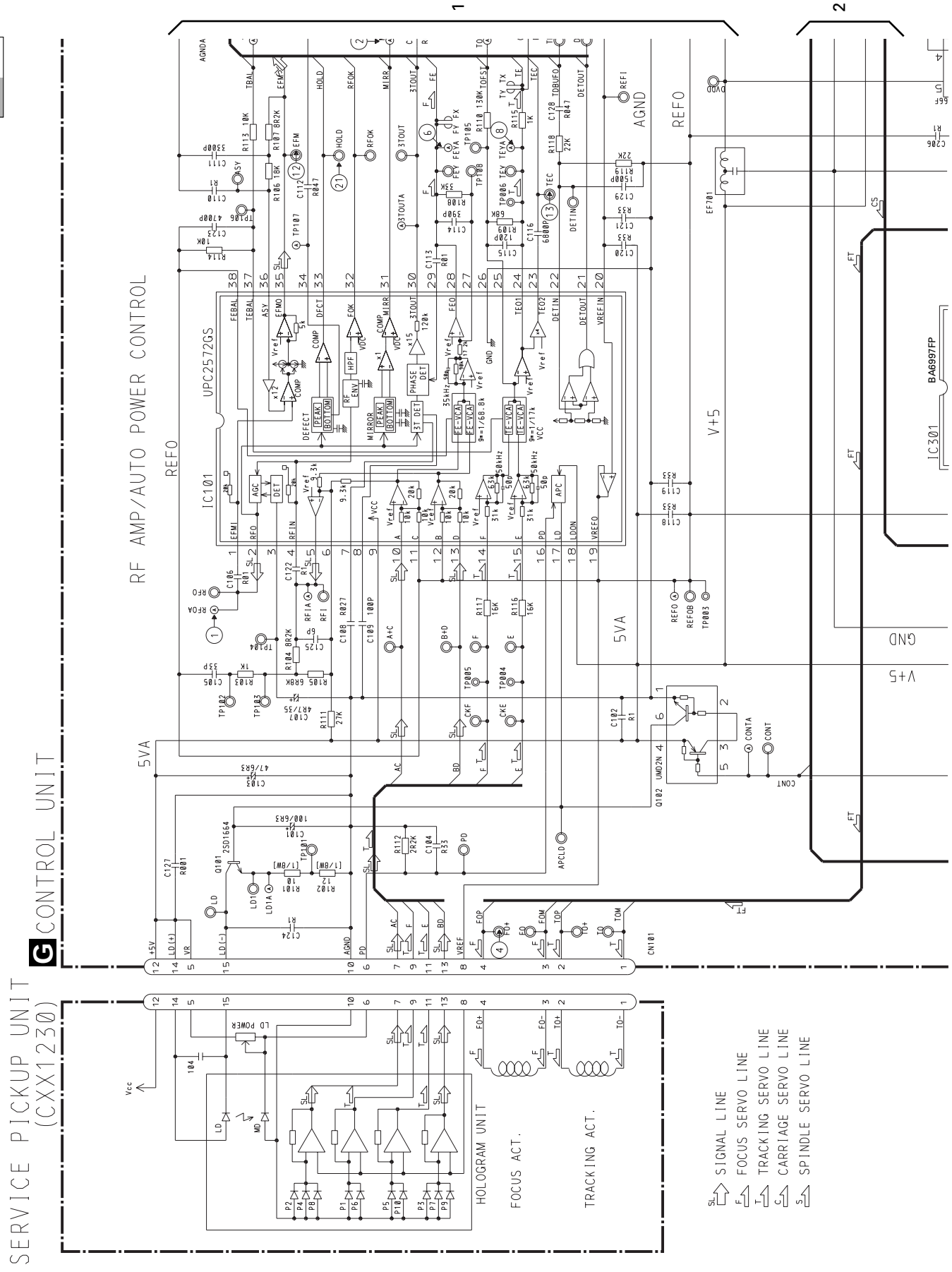


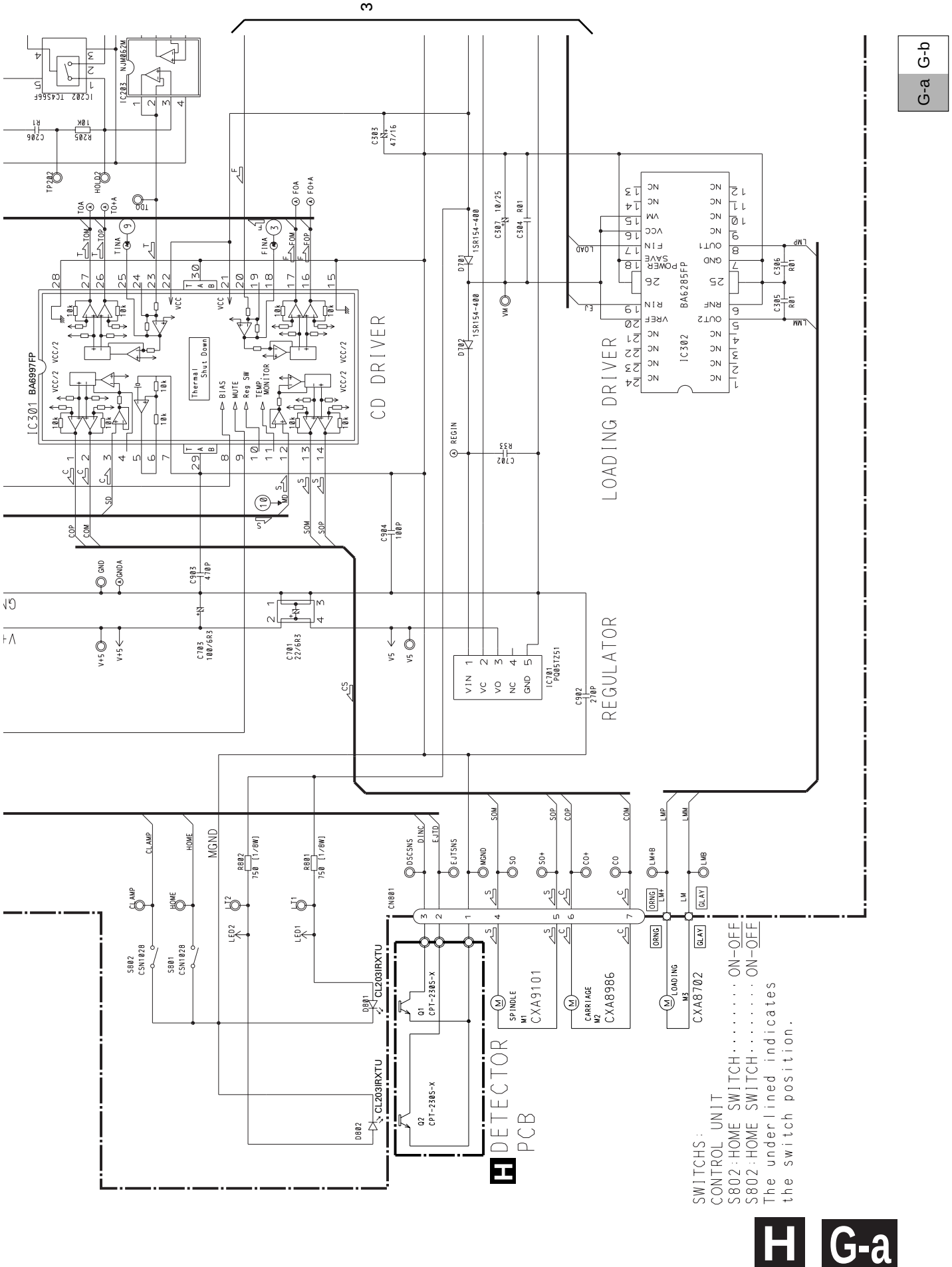
G H

G-b

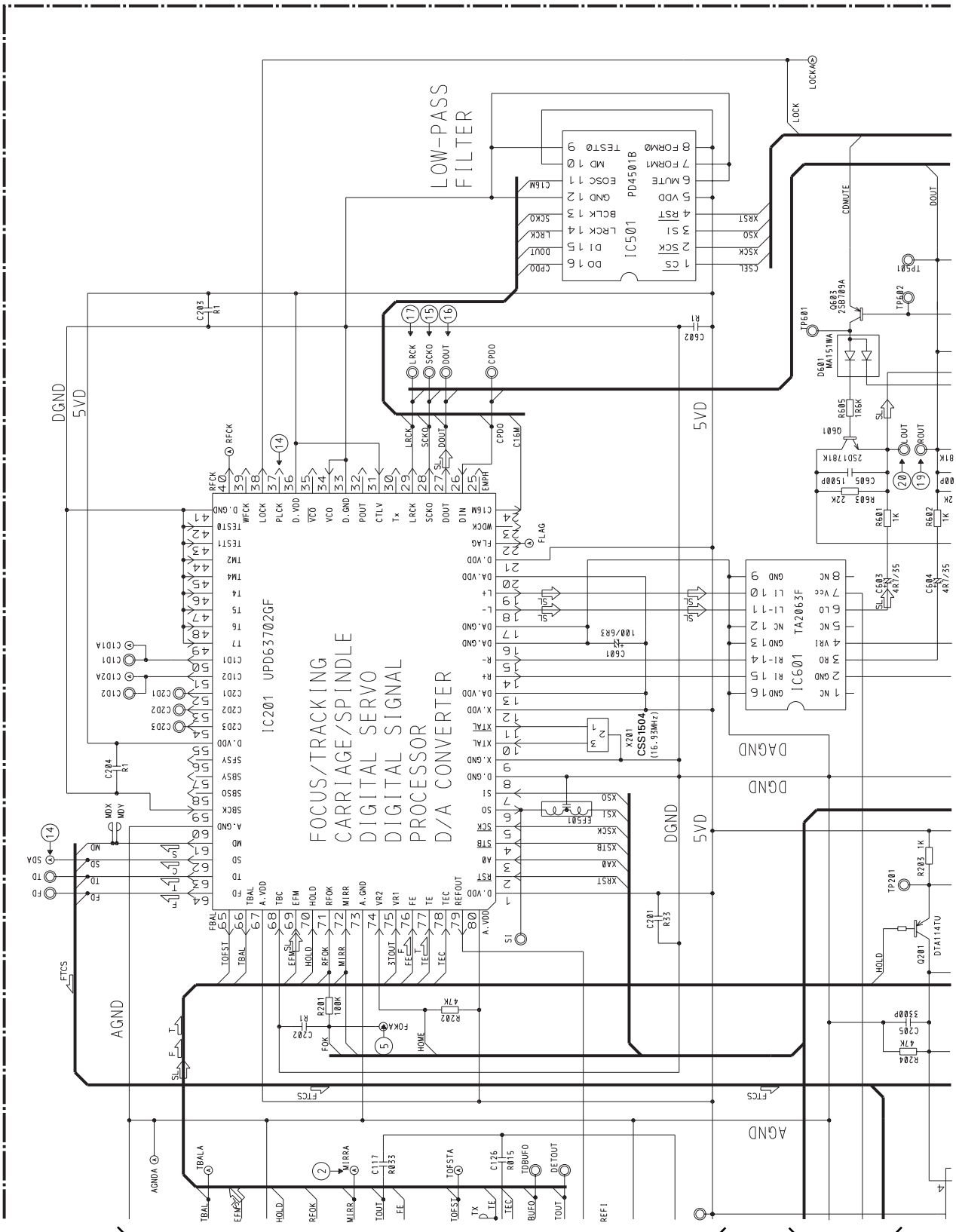

IC201 UPD63702GF
FOCUS/TRACKING
CARRIAGE/SPINDLE
DIGITAL SERVO
DIGITAL SIGNAL
PROCESSOR
D/A CONVERTER
LOW-PASS
FILTER
IC501 PD4501B
IC601 TA2063F
X201 CSS1504 (16.95MHz)
Q201 DTA114TU
Q202 UMD2N
Q601 2SD1781K
Q602 2SD1781K
Q603 2SB709A
D601 MA151WA
CN701
AGND
DGND
5VD
AAGND
PGND
VD
GND
FTCS
LOCK
CDMUTE
DOUT
CPDO
CSEL
XSCK
XSO
XRST
DFCNT
TDBUFO
DETOUT
HOLD
FOK
MIRR
LOCK
CONT
ROUT
AAGND
LOUT
CD5VON
CDLOAD
CDEJET
CSEL
GND
GND
PGND
PGND
CDMUTE
CSEL

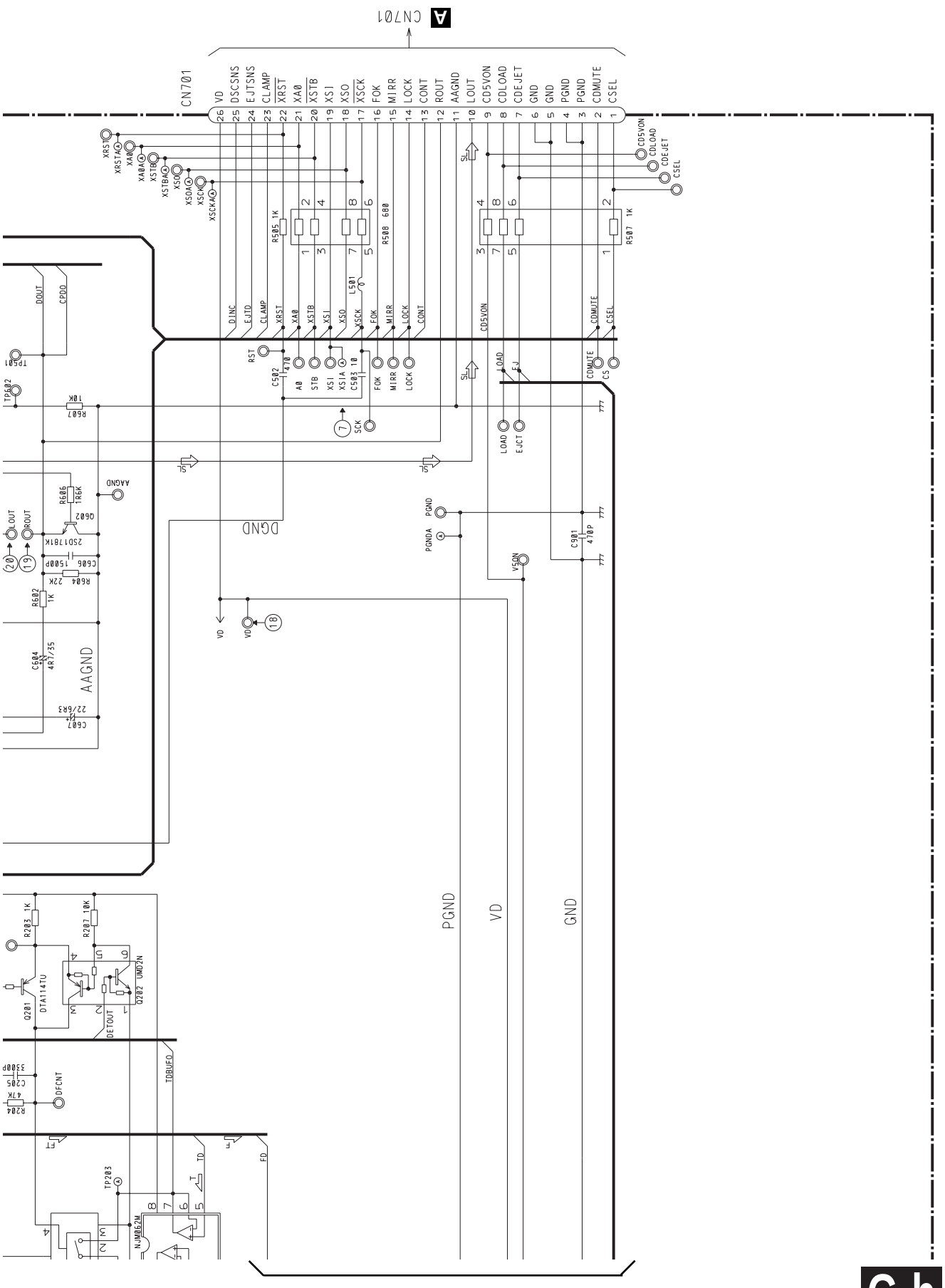
G-a G-b


G CONTROL UNIT
RF AMP/AUTO POWER CONTROL
IC101
UPC2572GS
REFO
5VA
V+5
AGND
GND
IC301
BA6897FP
CN101
Q102
UMD2N
Q101
2SD1664
SERVICE PICKUP UNIT
(CXX1230)
HOLOGRAM UNIT
FOCUS ACT.
TRACKING ACT.
LD POWER
SIGNAL LINE
FOCUS SERVO LINE
TRACKING SERVO LINE
CARRIAGE SERVO LINE
SPINDLE SERVO LINE


CD DRIVER
LOADING DRIVER
REGULATOR
DETECTOR PCB
IC301 BA6897FP
IC302 BA6285FP
IC201 PQ05TZ51
CXA9101
CXA8986
CXA8702
SWITCHS:
CONTROL UNIT
S802:HOME SWITCH·····ON-OFF
S802:HOME SWITCH·····ON-OFF
The underlined indicates
the switch position.

G-a G-b

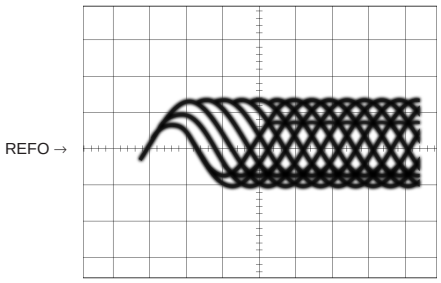

IC201 UPD63702GF
FOCUS/TRACKING
CARRIAGE/SPINDLE
DIGITAL SERVO
DIGITAL SIGNAL
PROCESSOR
D/A CONVERTER
IC501 PD4501B
LOW-PASS
FILTER
IC601 TA2063F
X201
CSS1504
(16.93MHz)
5VD
DGND
AGND
DAGND
LOCK
CDMUTE
DOUT
LRCK
SCKO
DOUT
CPDO
C16M
RFCK
EMPH
FLAG
MDX
MDY
SDA
TD
FD
FBAL
TBAL
TOFST
HOLD
RFOK
MIRR
FE
TE
TEC
REFOUT
FOK
HOME
FTCS
ETCS
TBALA
AGNDA
MIRRA
TOFSTA
TDBUFO
DETOUT
REFI
TX
IFC
BUFO
TOUT
Q201
DTA114TU
Q603
2SB709A
D601
MA151WA
Q601
2SD1781K
IC6601


CN701
VD
DSCSNS
EJTSNS
CLAMP
XRST
XA0
XSTB
XSI
XSO
XSCK
FOK
MIRR
LOCK
CONT
ROUT
AAGND
LOUT
CD5VON
CDLOAD
CDEJET
GND
GND
PGND
PGND
CDMUTE
CSEL
XRSTA
XA0A
XSTBA
XSOA
XSCKA
R505 1K
R508 680
R507 1K
L501 0
C502 470
C503 10
R607 10K
C604 4K7/35
C607 22/6R3
R606 1R6K
Q602 2SD1781K
C606 1500P
R604 22K
R602 1K
C901 470P
R203 1K
R207 10K
Q201 DTA114TU
Q202 UMD2N
C205 3300P
R204 47K
TP203
NJM862M
AAGND
DGND
PGND
VD
GND
V5ON
DOUT
CPDO
DINC
EJTD
RST
A0
STB
XSI
XSIA
SCK
FOK
MIRR
LOCK
CONT
LOAD
EJCT
CS
DETOUT
TDBUFO
OFCNT
FT
FD
TD

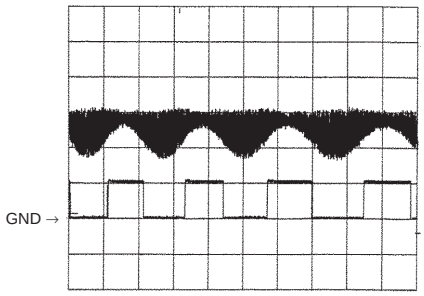
Note:1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
REFO:2.5V

● Waveforms

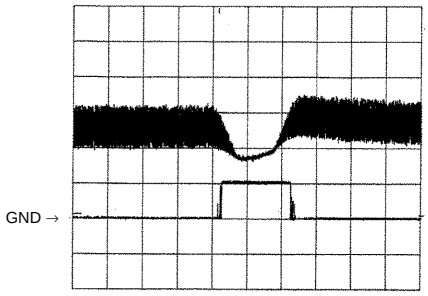
① RFO 0.5V/div. 0.5µs/div.
Normal mode: play



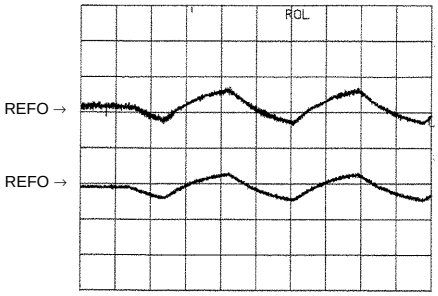
① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Test mode: Tracking open



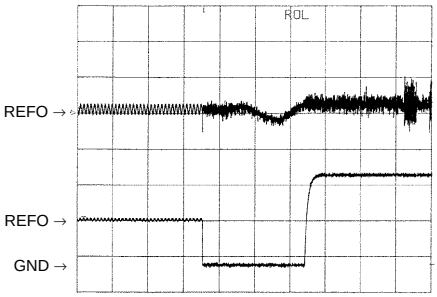
① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div.
Normal mode: The defect part passes 800µm



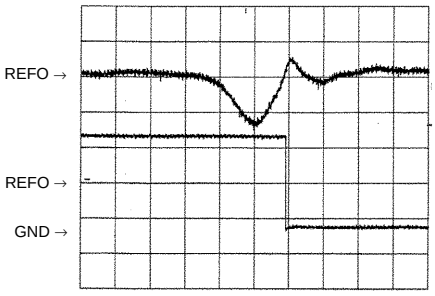
③ CH1: FIN 0.5V/div. 0.2s/div.
④ CH2: FO+ 2V/div.
Test mode: No disc, Focus close



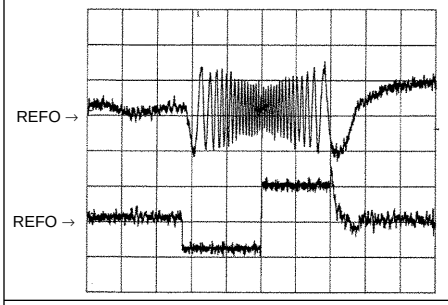
③ CH1: FIN 0.5V/div. 0.2s/div.
⑤ CH2: FOK 2V/div.
Normal mode: Focus close



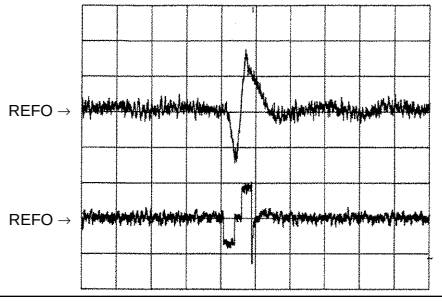
⑥ CH1: FEY 0.5V/div. 1ms/div.
⑦ CH2: XSI 2V/div.
Normal mode: Focus close



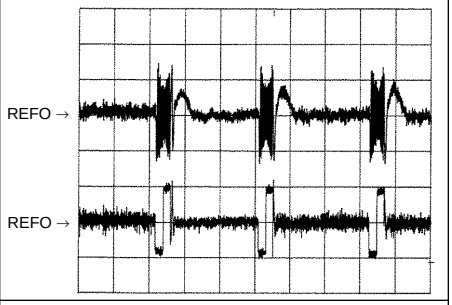
⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div.
Test mode: 32 tracks jump (FWD)



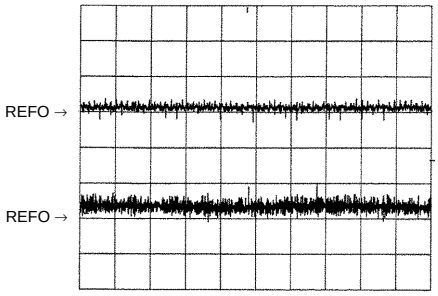
⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div.
Test mode: Single jump (FWD)



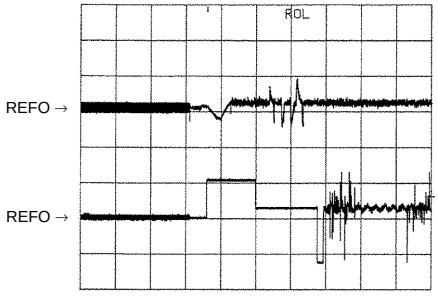
⑧ CH1: TEY 0.5V/div. 5ms/div.
⑨ CH2: TIN 0.5V/div.
Test mode: 100 tracks jump (FWD)



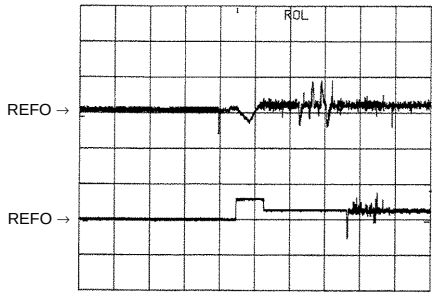
⑥ CH1: FEY 0.1V/div. 20ms/div.
③ CH2: FIN 0.2V/div.
Normal mode: Play



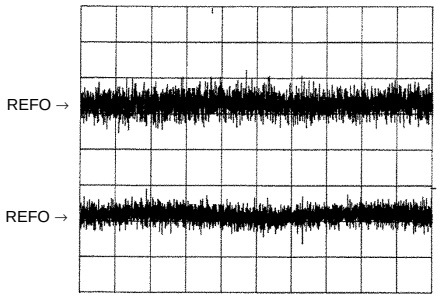
③ CH1: FIN 0.5V/div. 0.5s/div.
⑩ CH2: SIN 1V/div.
Normal mode: Focus close (12cm)



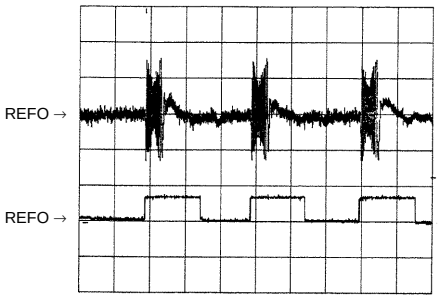
③ CH1: FIN 0.5V/div. 0.5s/div.
⑩ CH2: SIN 1V/div.
Normal mode: Focus close (8cm)



⑧ CH1: TEY 0.2V/div. 20ms/div.
⑨ CH2: TIN 0.2V/div.
Normal mode: play

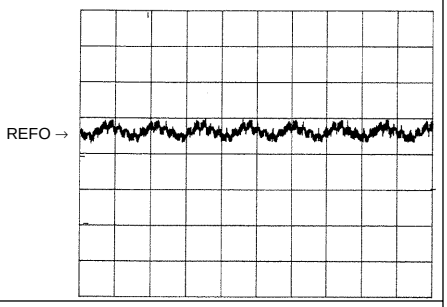


⑧ CH1: TEY 0.5V/div. 5ms/div.
⑪ CH2: SD 0.5V/div.



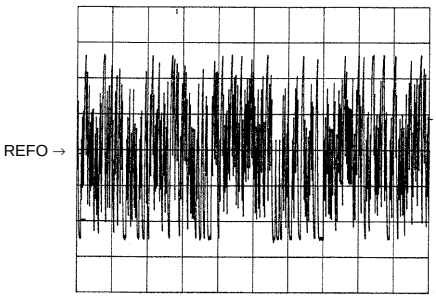
⑩ SIN 0.5V/div. 0.1s/div.

Normal mode: Play (12cm)



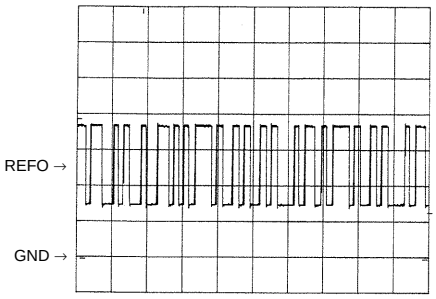
⑩ SIN 0.5V/div. 10ms/div.

Long Search (12cm)

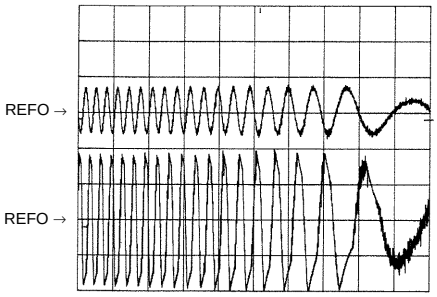


⑫ EFM 1V/div. 5µs/div.

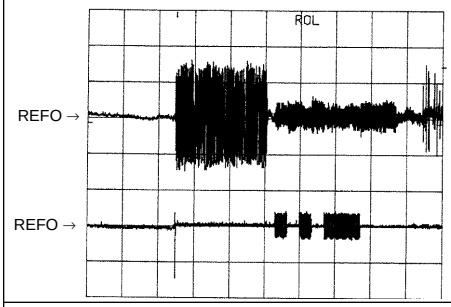
Play



⑧ CH1: TEY 1V/div. 2ms/div.
⑬ CH2: TEC 1V/div.
Test mode: Focus close
Tracking open

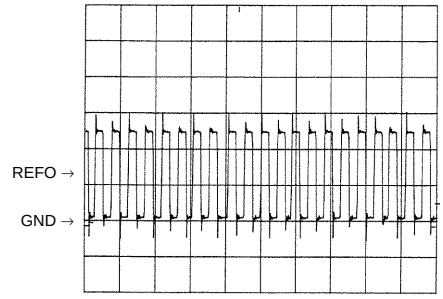


⑧ CH1: TEY 0.5V/div. 0.2s/div.
⑥ CH2: FEY 0.5V/div.
Normal mode: AGC after focus close



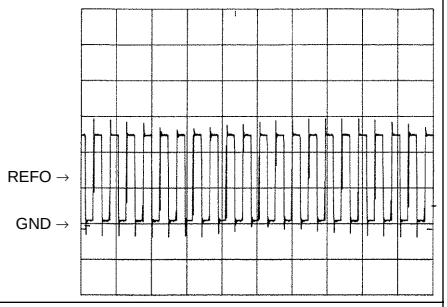
⑭ PLCK 2V/div. 0.5µs/div.

Play



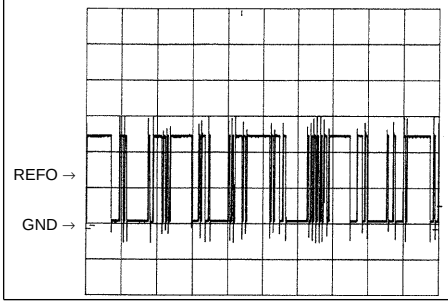
⑮ SCKO 2V/div. 1µs/div.

Play

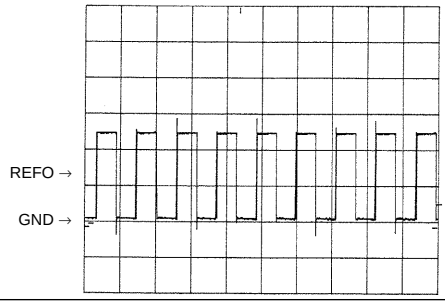


⑯ Dout 2V/div. 10µs/div.

Play

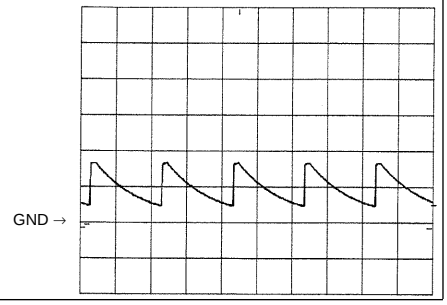


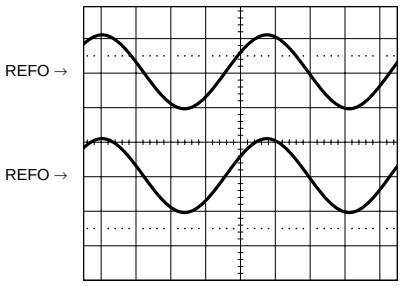
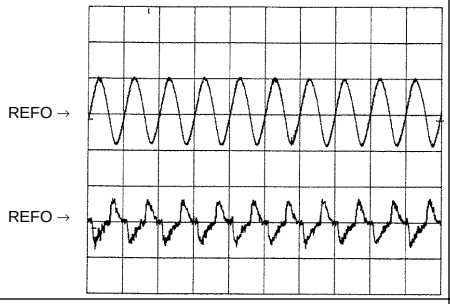
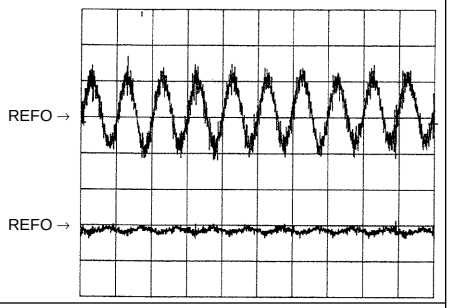
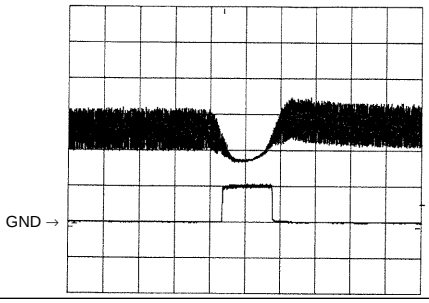
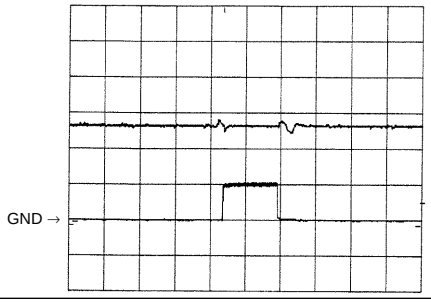
⑰ LRCK 2V/div. 20µs/div.



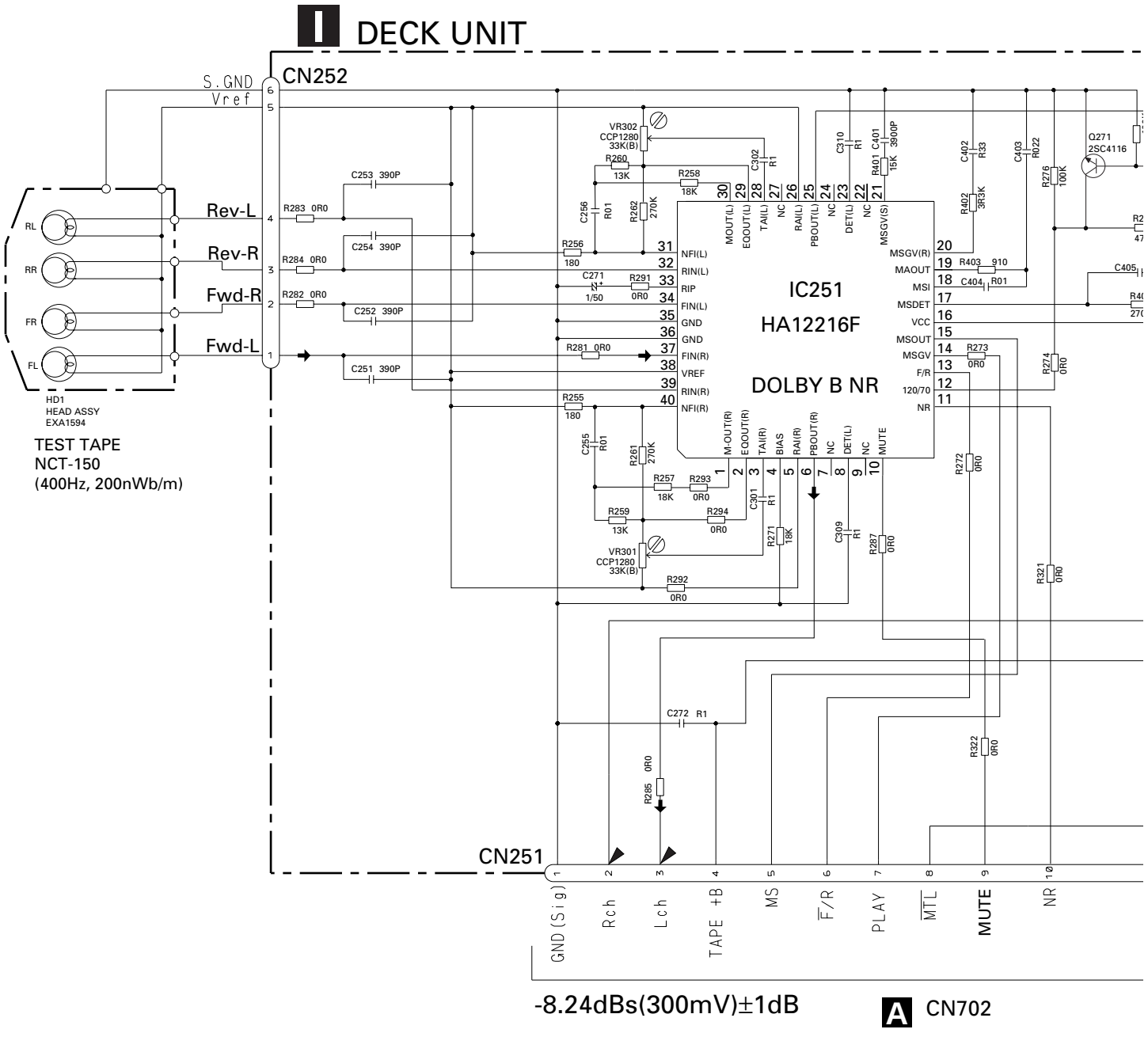
⑱ VD 5V/div. 50ms/div.

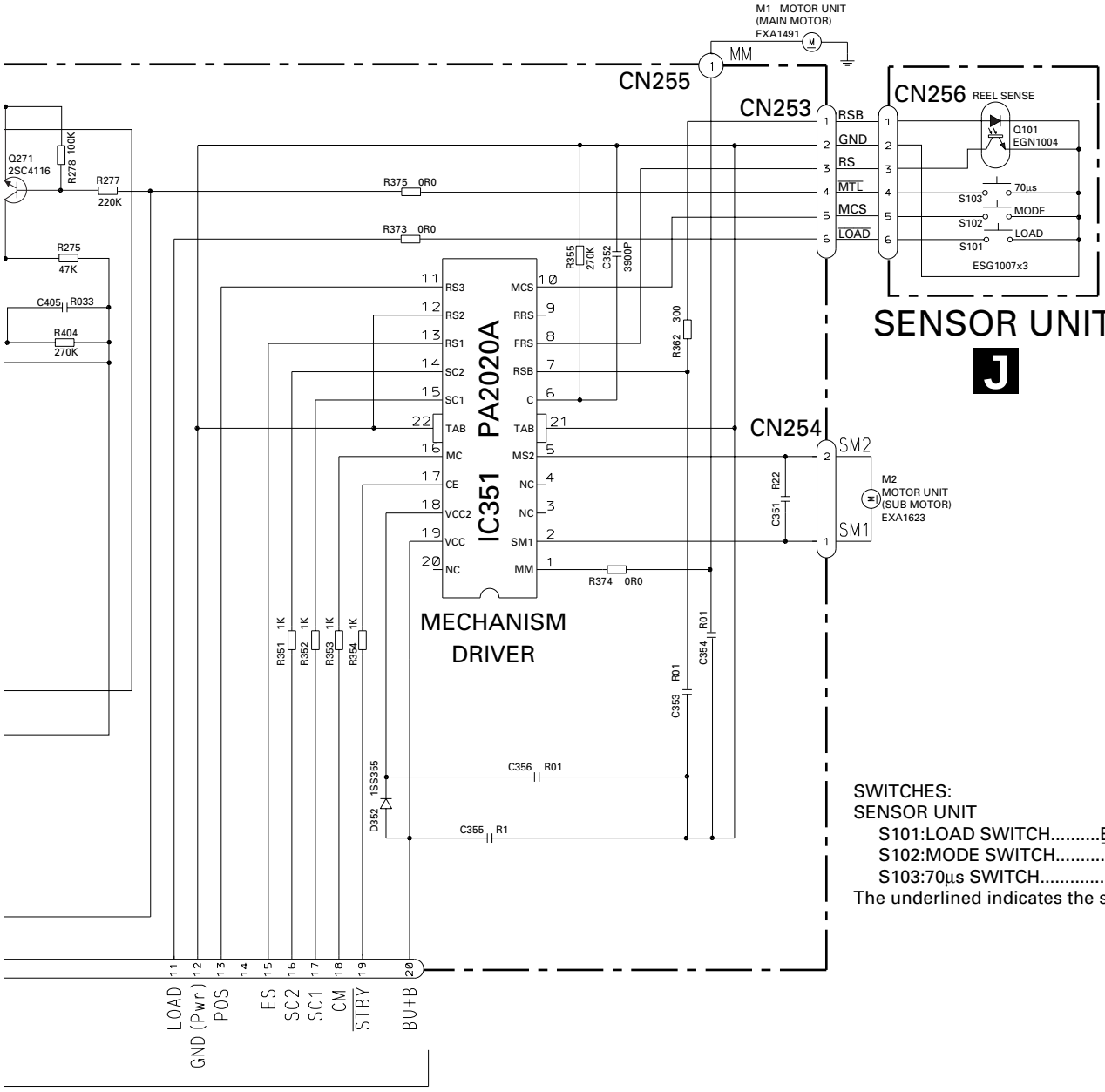
Normal mode: No disc



⑲ CH1: R OUT 1V/div. ⑳ CH2: L OUT 1V/div. 0.2ms/div. Normal mode: Play (1kHz 0dB) 	⑥ CH1: FEY 0.2V/div. ③ CH2: FIN 0.5V/div. 1ms/div. Normal mode: During AGC 	⑧ CH1: TEY 0.2V/div. ⑨ CH2: TIN 0.5V/div. 1ms/div. Normal mode: During AGC 
① CH1: RFO 1V/div. ㉑ CH2: HOLD 5V/div. 0.5ms/div. Normal mode: The defect part passes 800µm 	③ CH1: FIN 1V/div. ㉑ CH2: HOLD 5V/div. 0.5ms/div. Normal mode: The defect part passes 800µm 	

3.9 CASSETTE MECHANISM MODULE





SWITCHES:
SENSOR UNIT
S101:LOAD SWITCH.....EJECT-PLAY
S102:MODE SWITCH.....ON-OFF
S103:70µs SWITCH.....ON-OFF
The underlined indicates the switch position.

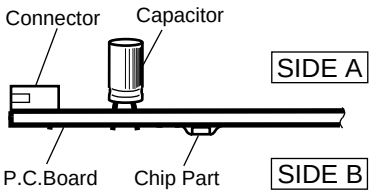
4. PCB CONNECTION DIAGRAM

4.1 MOTHER UNIT

NOTE FOR PCB DIAGRAMS

1. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.

2. Viewpoint of PCB diagrams



IC, Q

IC301

Q319

Q320

IC212
Q803 Q801
IC215
Q505

Q802 Q502
Q805
IC801 Q503
Q807 Q806
Q312 Q307 IC101
Q308 Q313
Q618 IC102 Q506
Q619 Q304

Q311
IC802 Q620

IC501

Q616 Q630

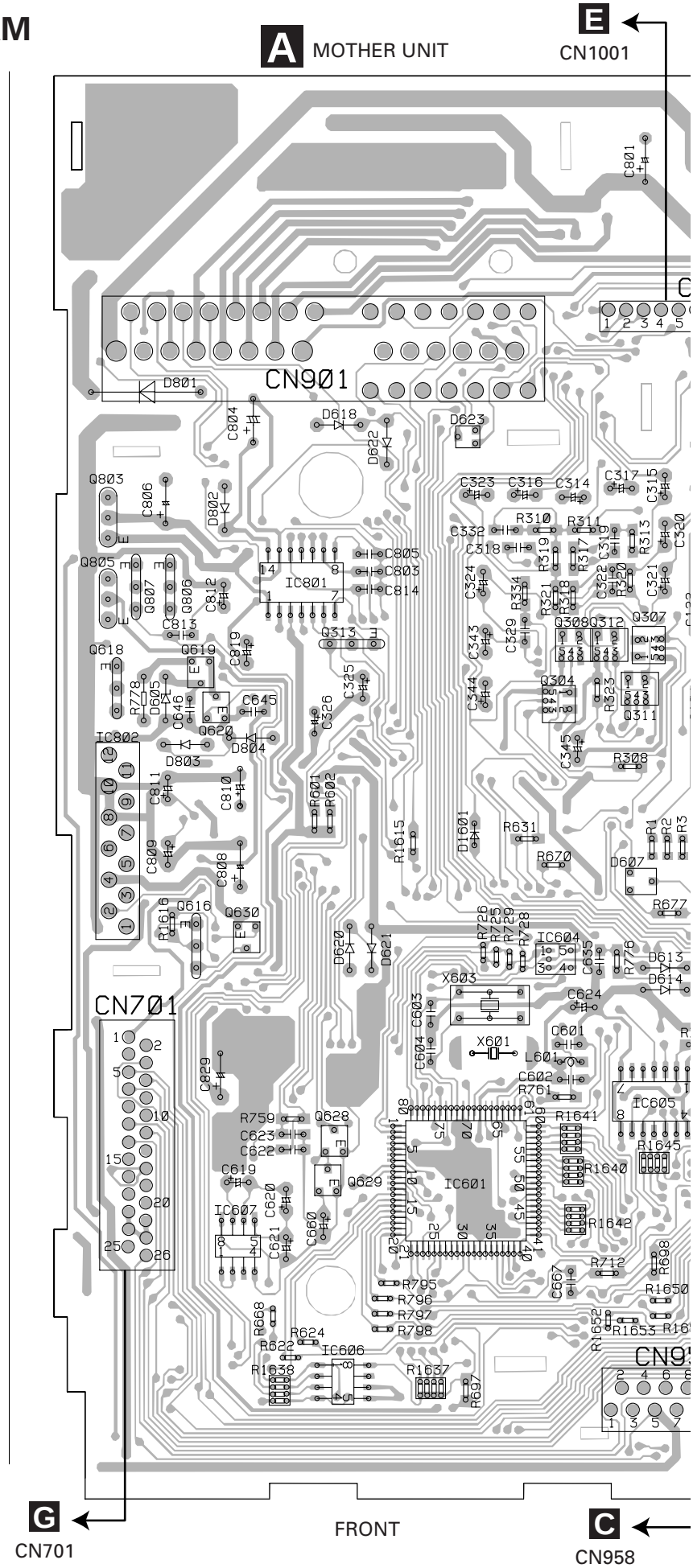
Q626 Q623 Q622
IC604 Q627

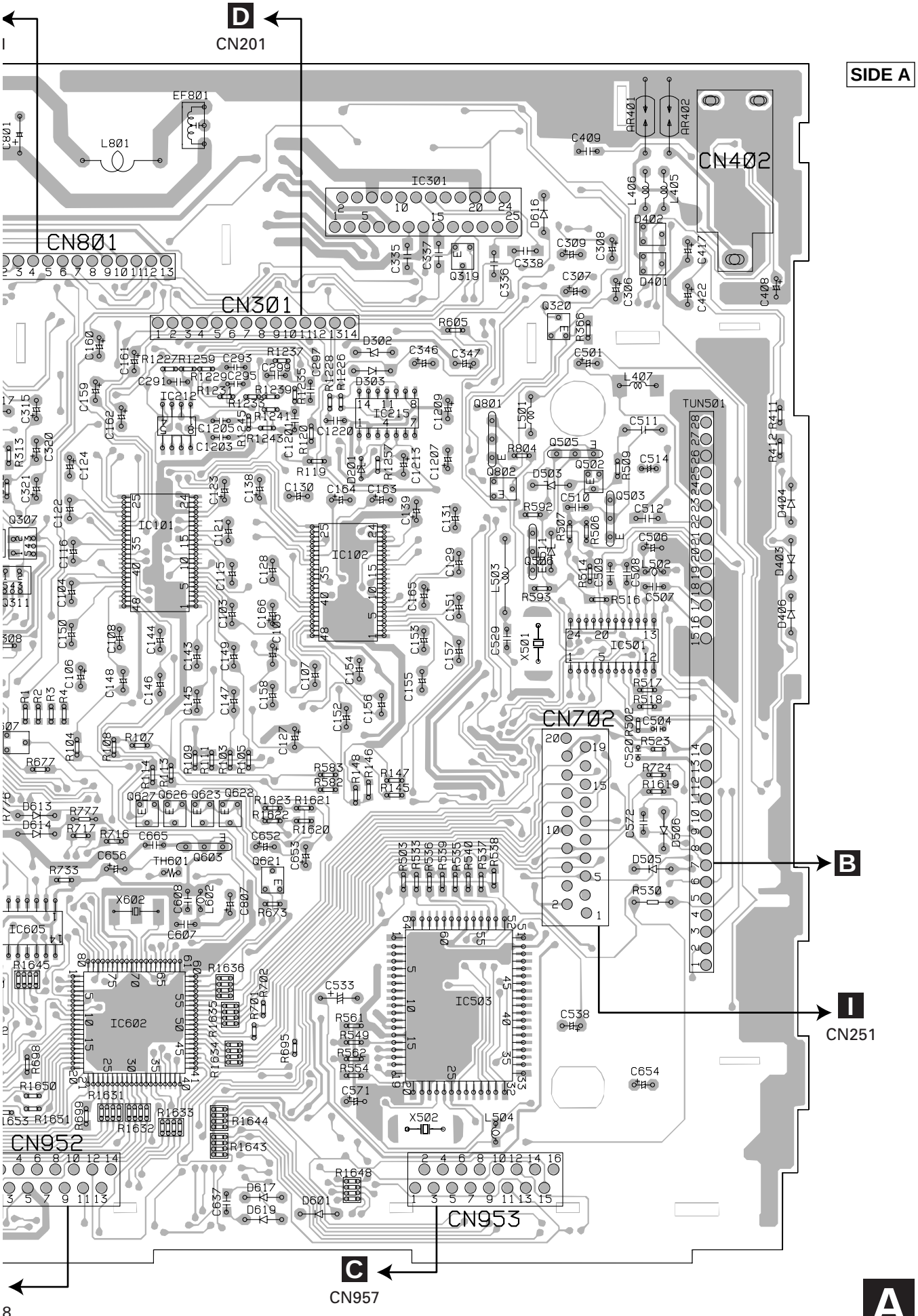
Q603 Q621

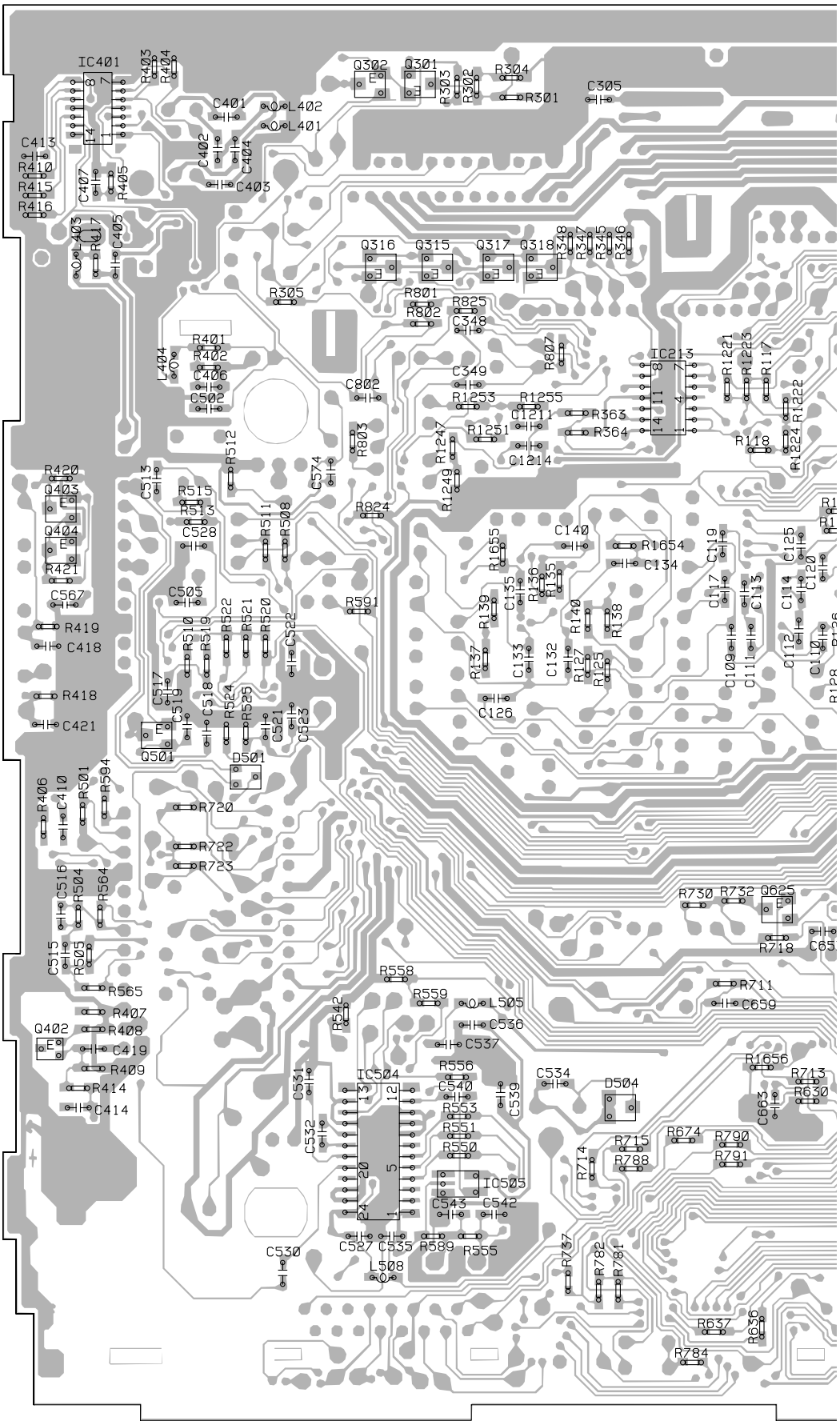
IC605
Q628

Q629
IC601 IC503
IC607 IC602

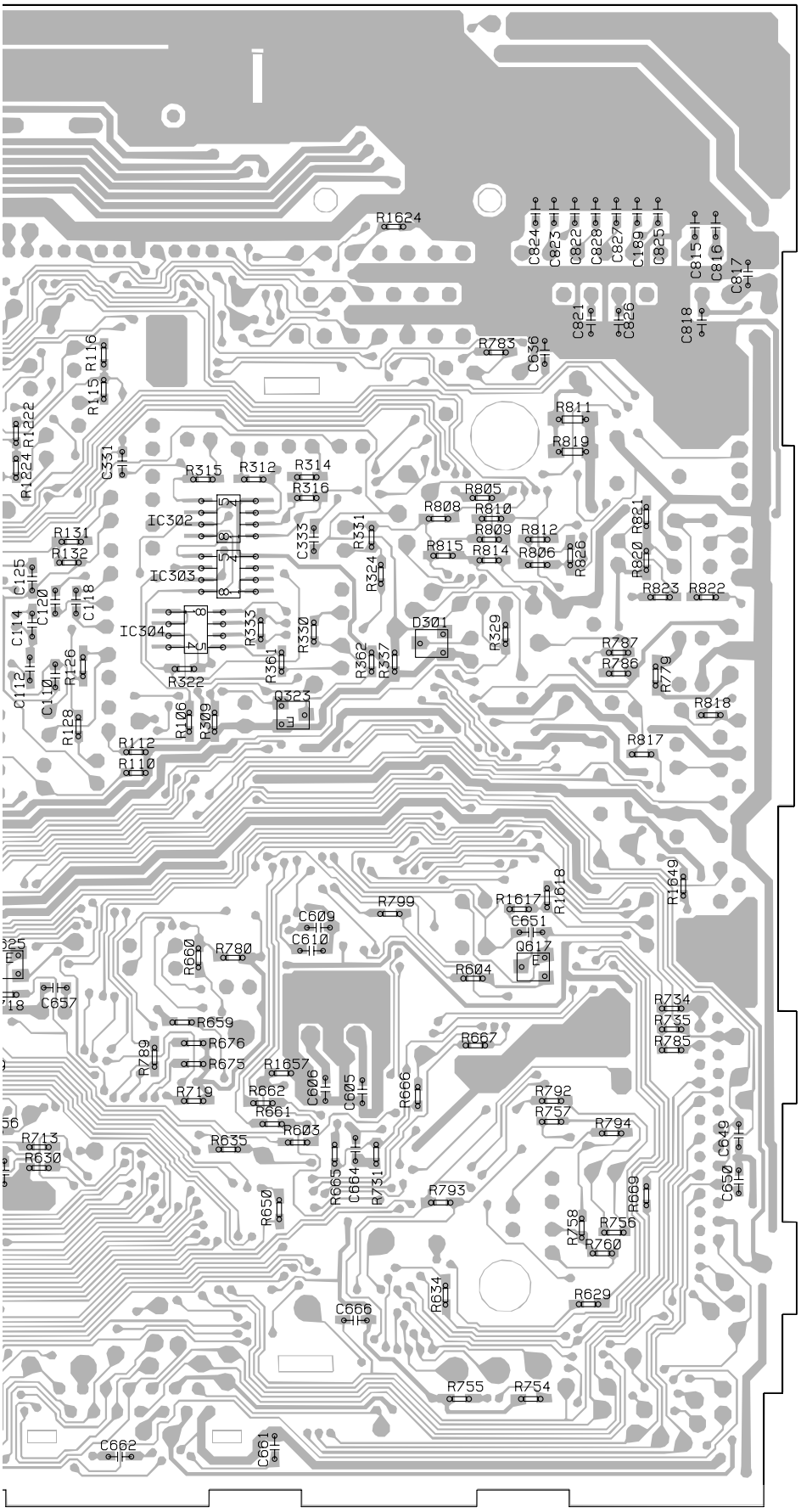
IC606




SIDE A
CN201
CN801
CN301
CN402
CN702
CN952
CN953
CN957
CN251
TUN501
IC101
IC102
IC215
IC501
IC503
IC602
IC605
X501
X502
X602
TH601
EF801
L801
D
B
C
I
A


IC401
R403
R404
C401
L402
L401
C413
R410
R415
R416
C407
R405
C402
C404
C403
L403
R417
C405
Q316
Q315
Q317
Q318
R348
R347
R345
R346
R305
R801
R802
R825
C348
R807
IC213
R1221
R1223
R117
R401
R402
C406
C502
L404
C802
C349
R1253
R1255
C1211
R363
R364
R1251
R1247
R1249
C1214
R1222
R1224
R118
R512
R503
C574
R824
R420
Q403
Q404
R421
C513
R515
R513
C528
R511
R508
C567
R419
C418
C505
R510
R519
R522
R521
R520
C522
R591
R1655
C140
R1654
C134
C119
C125
C135
R136
R135
C120
R139
R140
R138
C117
C113
C114
C133
C132
R127
R125
C112
C110
C126
R418
C421
C517
C519
C518
R524
R525
C521
C523
Q501
D501
R406
C410
R501
R594
R720
R722
R723
C516
R504
R564
C515
R505
R730
R732
Q625
R718
C651
R565
R407
R408
C419
R409
R414
C414
Q402
R558
R559
L505
C536
C537
R542
C531
C532
IC504
R556
C540
R553
R551
R550
C539
C534
D504
R1656
R713
R630
C663
R715
R674
R790
R791
R788
R714
IC505
C543
C542
C530
C527
C535
R589
R555
L508
R737
R782
R781
R711
C659
R637
R636
R784

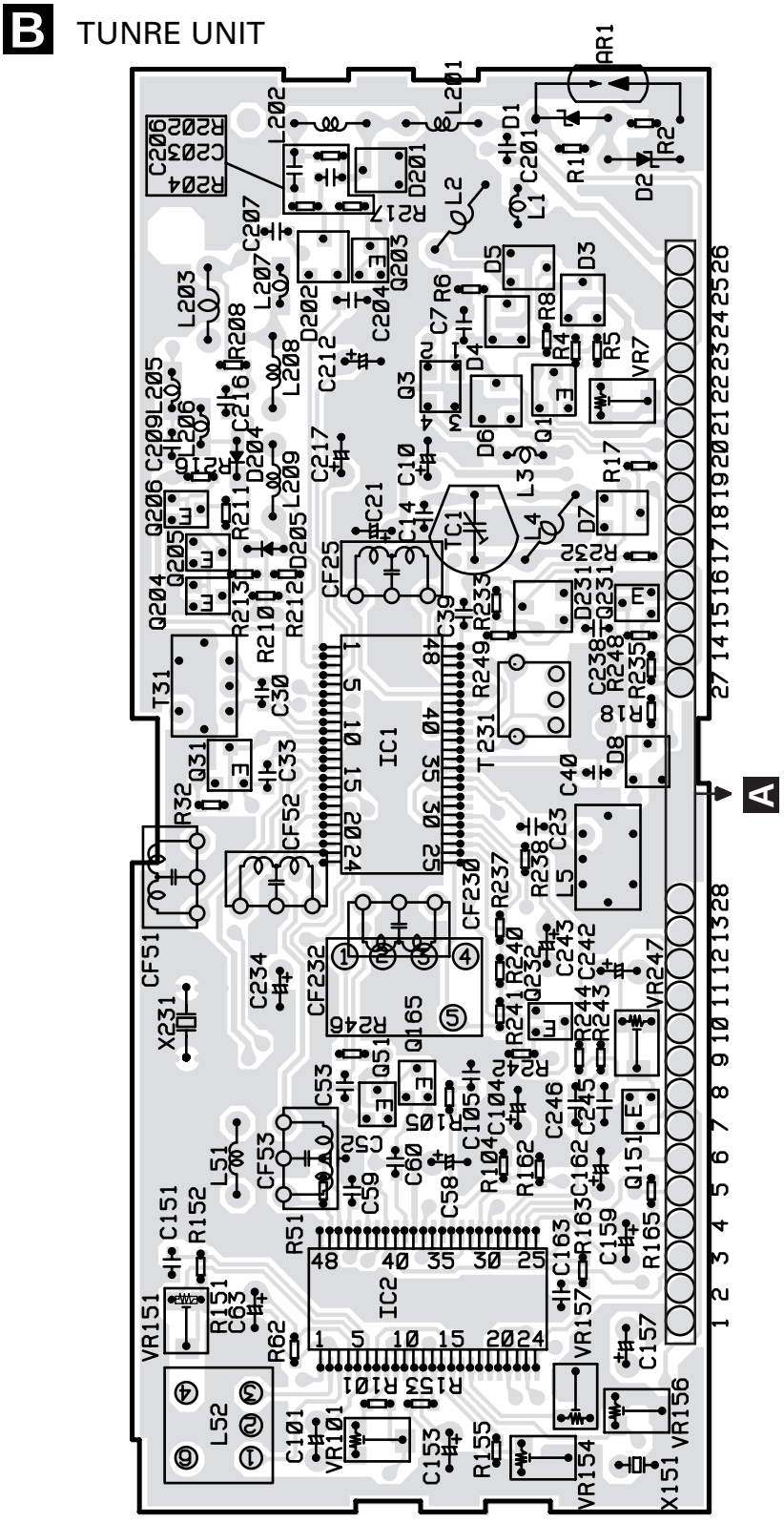
A


SIDE B
IC, Q
IC401 Q302 Q301
Q316 Q315
Q317 Q318
IC213
Q403
IC302
Q404
IC303
IC304
Q323
Q501
Q625 Q617
Q402
IC504
IC505
R1624
C824
C823
C822
C828
C827
C189
C825
C815
C816
C817
C821
C826
C818
R783
C636
R811
R819
R1222
R116
R115
R224
C331
R315
R312
R314
R316
IC302
IC303
R131
R132
C125
C120
C118
C333
R331
R324
R805
R808
R810
R809
R812
R815
R814
R806
R826
R821
R820
R823
R822
C114
C112
C110
R126
R128
R106
R309
R322
IC304
R333
R330
R361
R362
R337
D301
R329
R787
R786
R779
R818
R817
R112
R110
Q323
R1649
R1618
R1617
R799
C609
C610
C651
Q617
R660
R780
R604
C657
R734
R735
R785
R659
R676
R675
R667
R789
R719
R662
R661
R1657
C606
C605
R666
R792
R757
R794
R603
R635
R713
R630
C649
C650
R731
R665
C664
R793
R650
R669
R758
R756
R760
R634
R629
C666
R755
R754
C662
C661

4.2 TUNER UNIT

B TUNRE UNIT

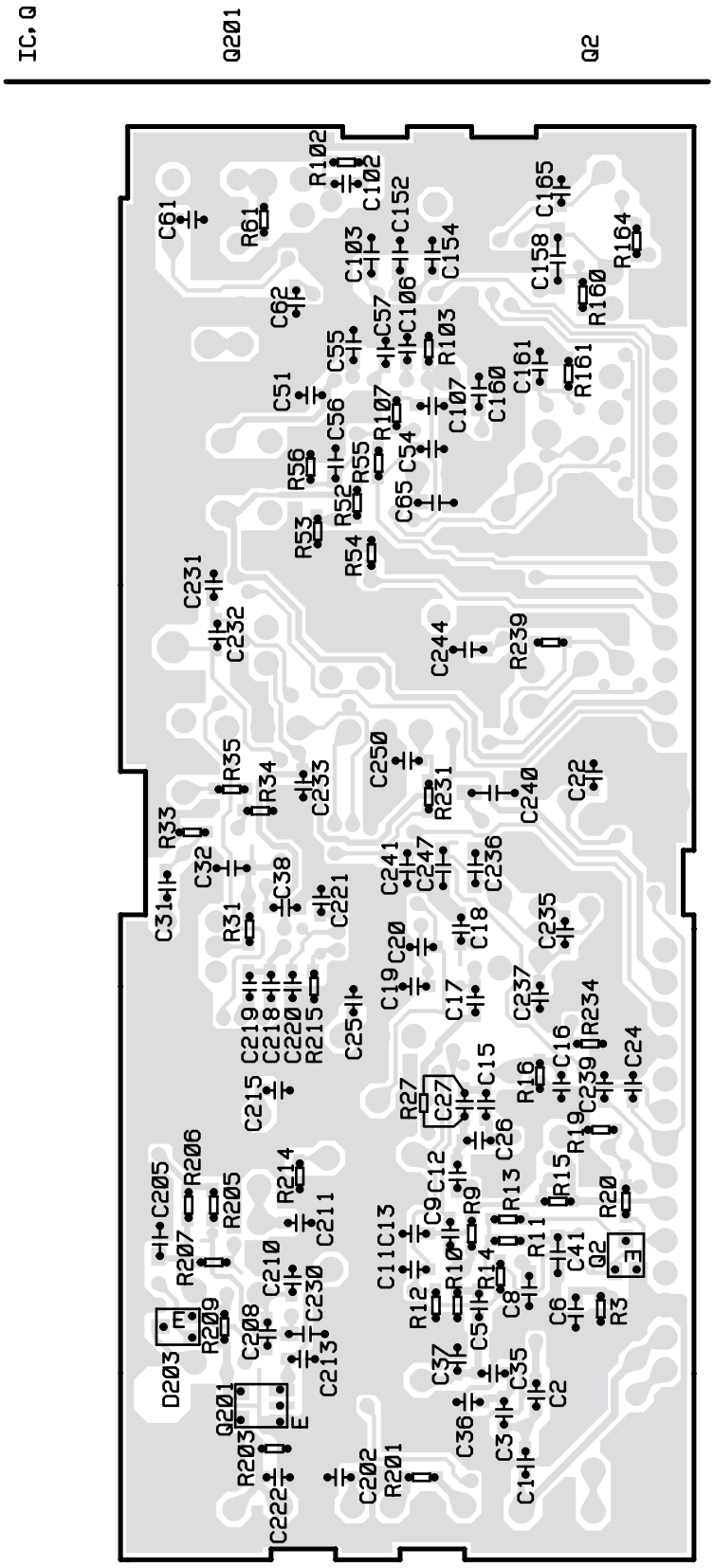
SIDE A



ADJ
VR151 T31
VR101
TC1
L4
VR154 VR157 VR247 VR7 VR156
IC, Q
Q206 Q205 Q204
Q31
IC1 Q203 Q165
IC2 Q3 Q51
Q232 Q1
Q231 Q151

B TUNRE UNIT

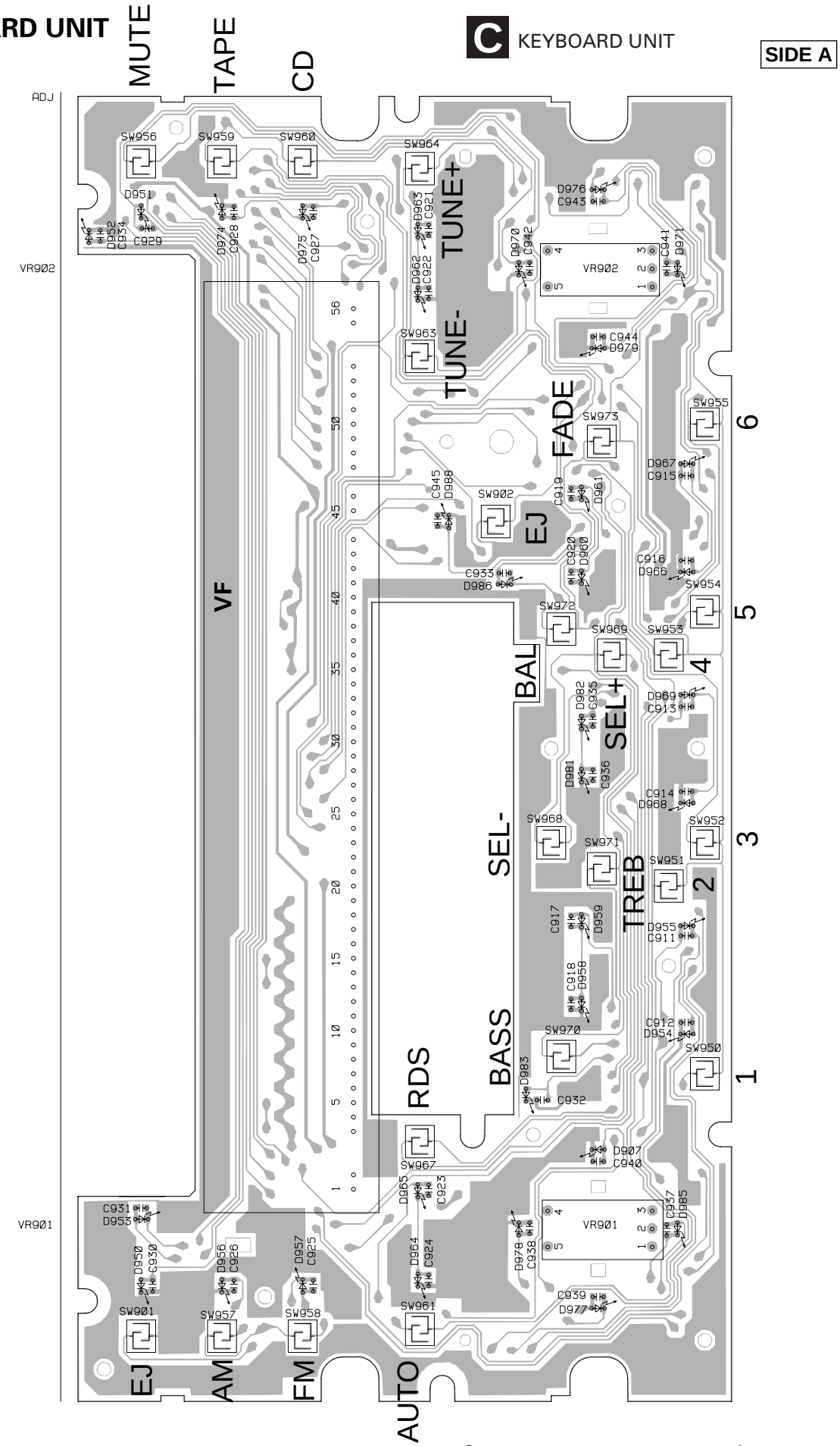
SIDE B



4.3 KEYBOARD UNIT

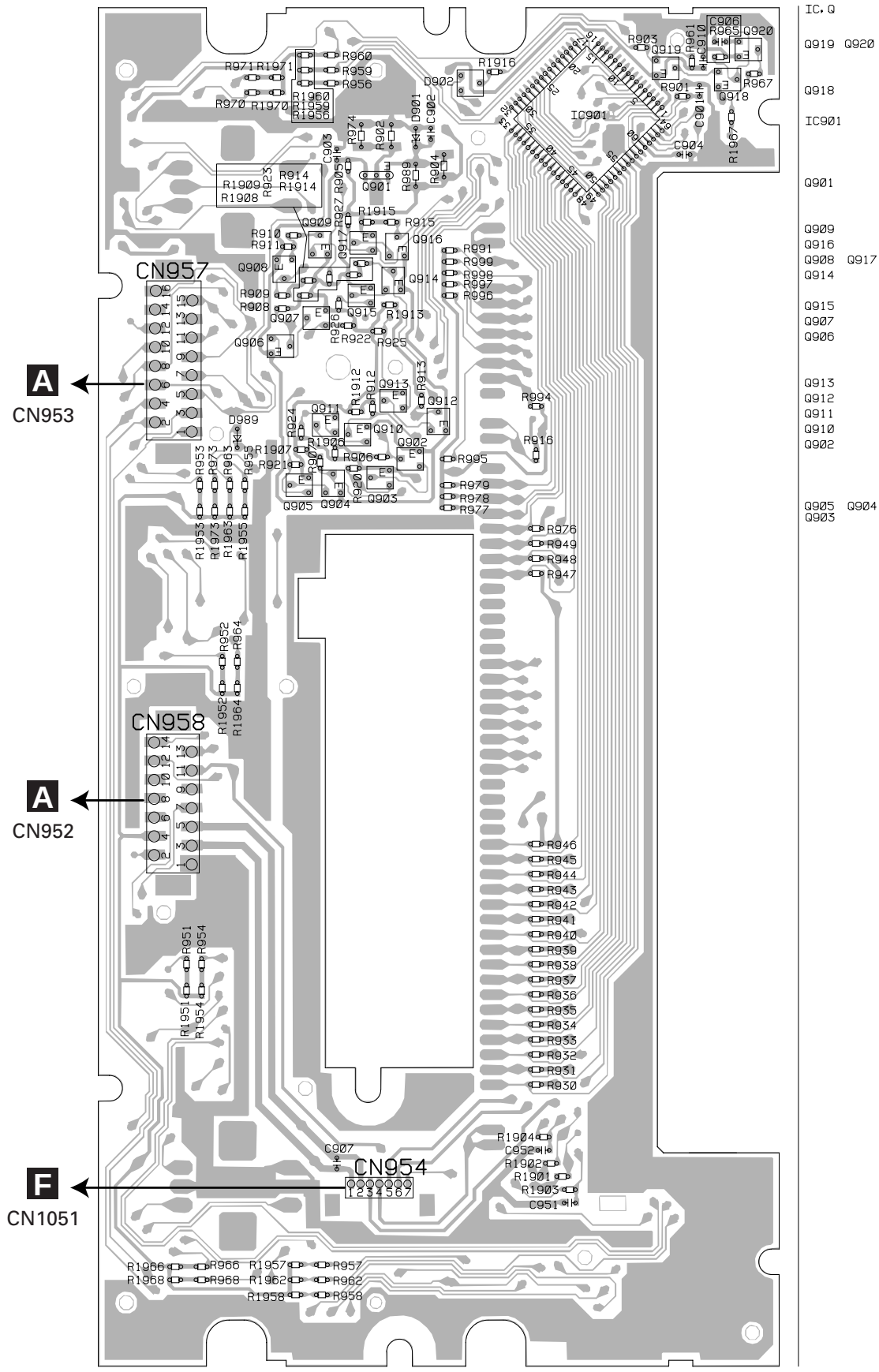
C KEYBOARD UNIT

SIDE A



C KEYBOARD UNIT

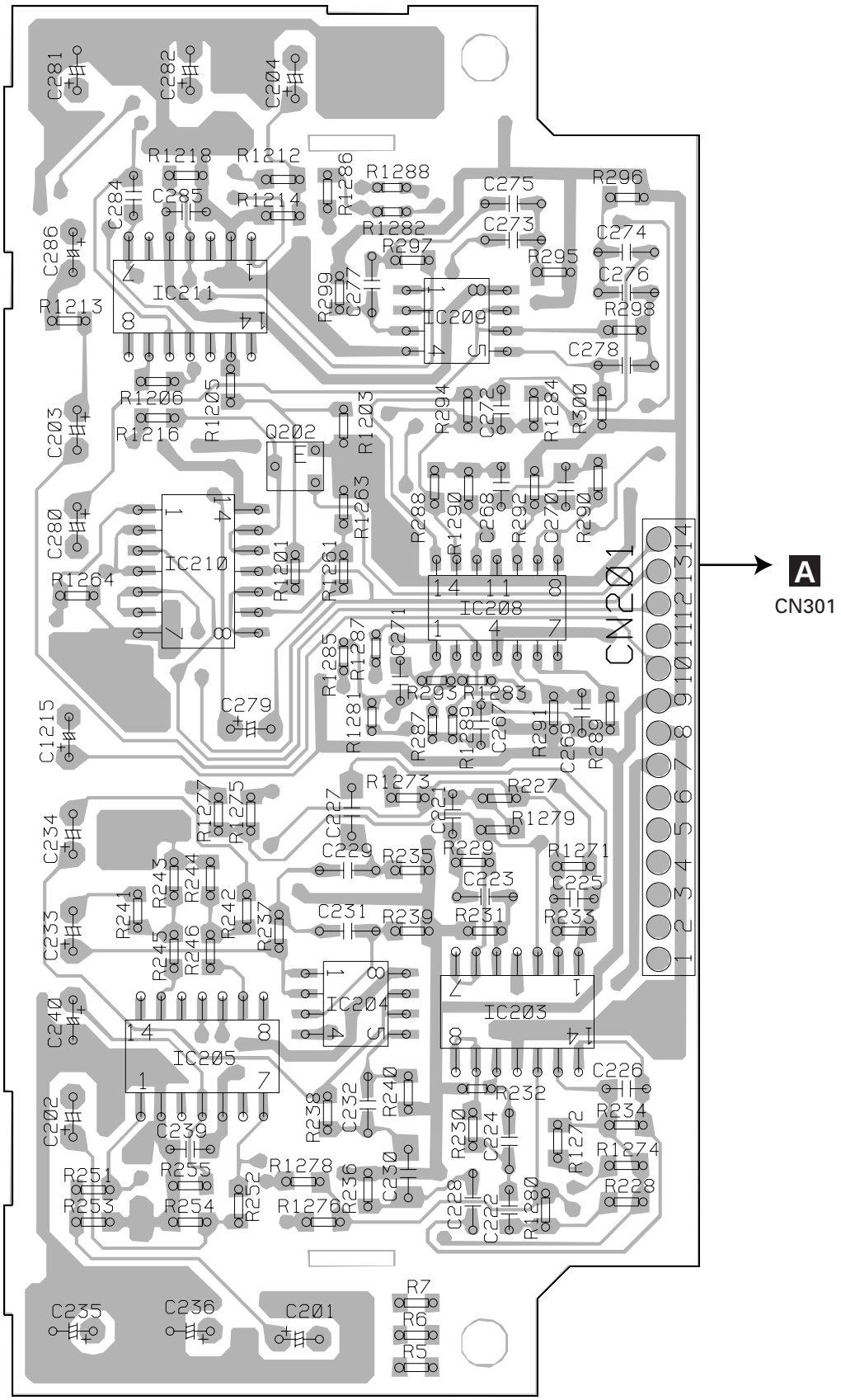
SIDE B



4.4 EQ PCB

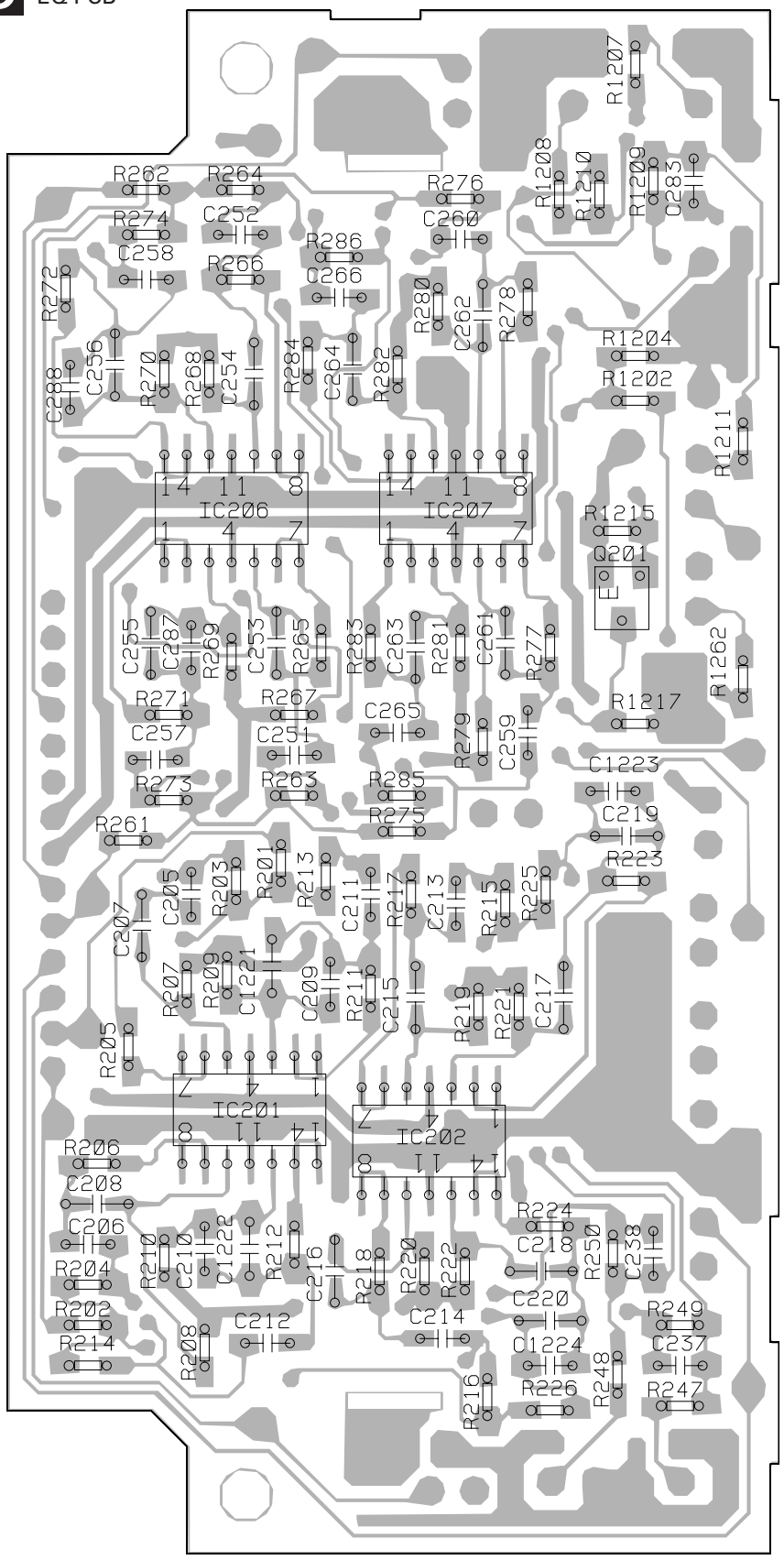
D EQ PCB

SIDE A



D EQ PCB

SIDE B



IC, Q

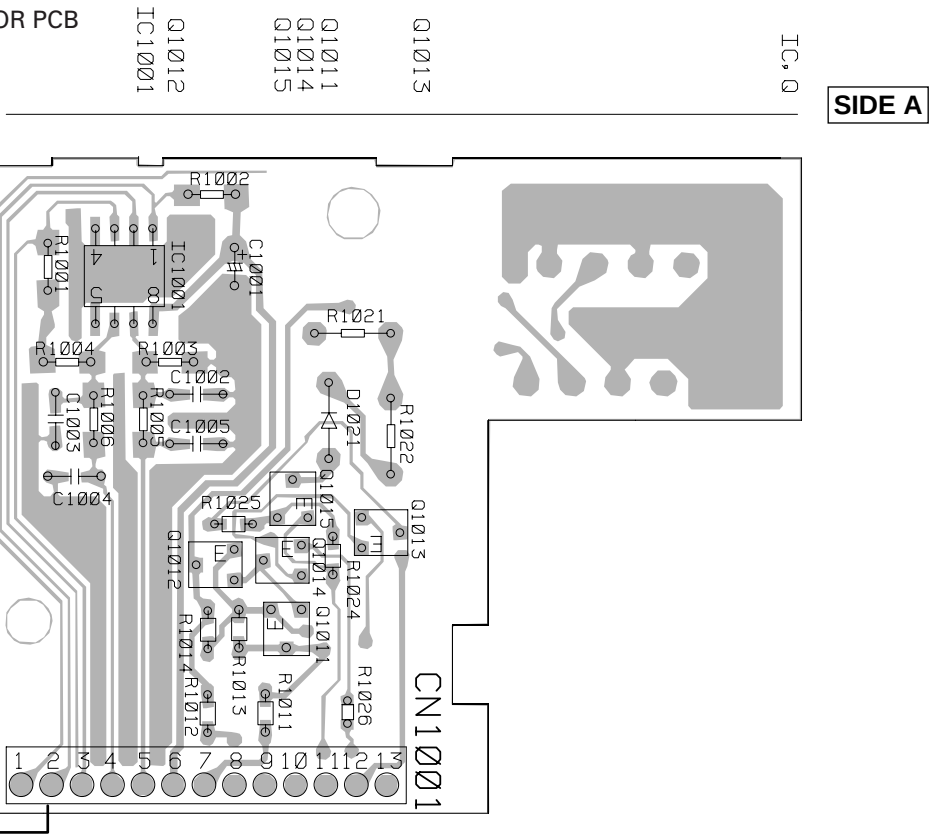
IC206
IC207
Q201

IC201
IC202

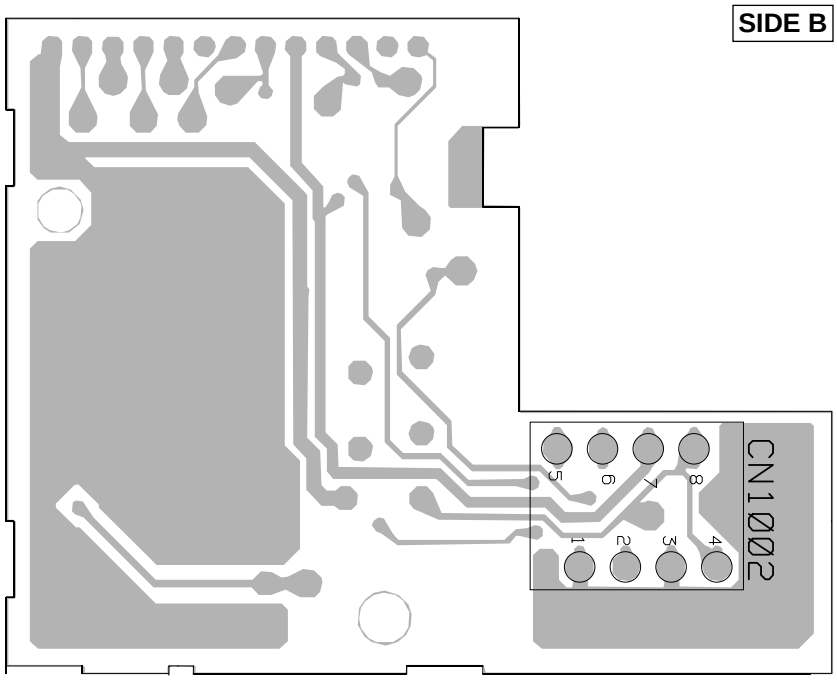
D

4.5 CONNECTOR PCB

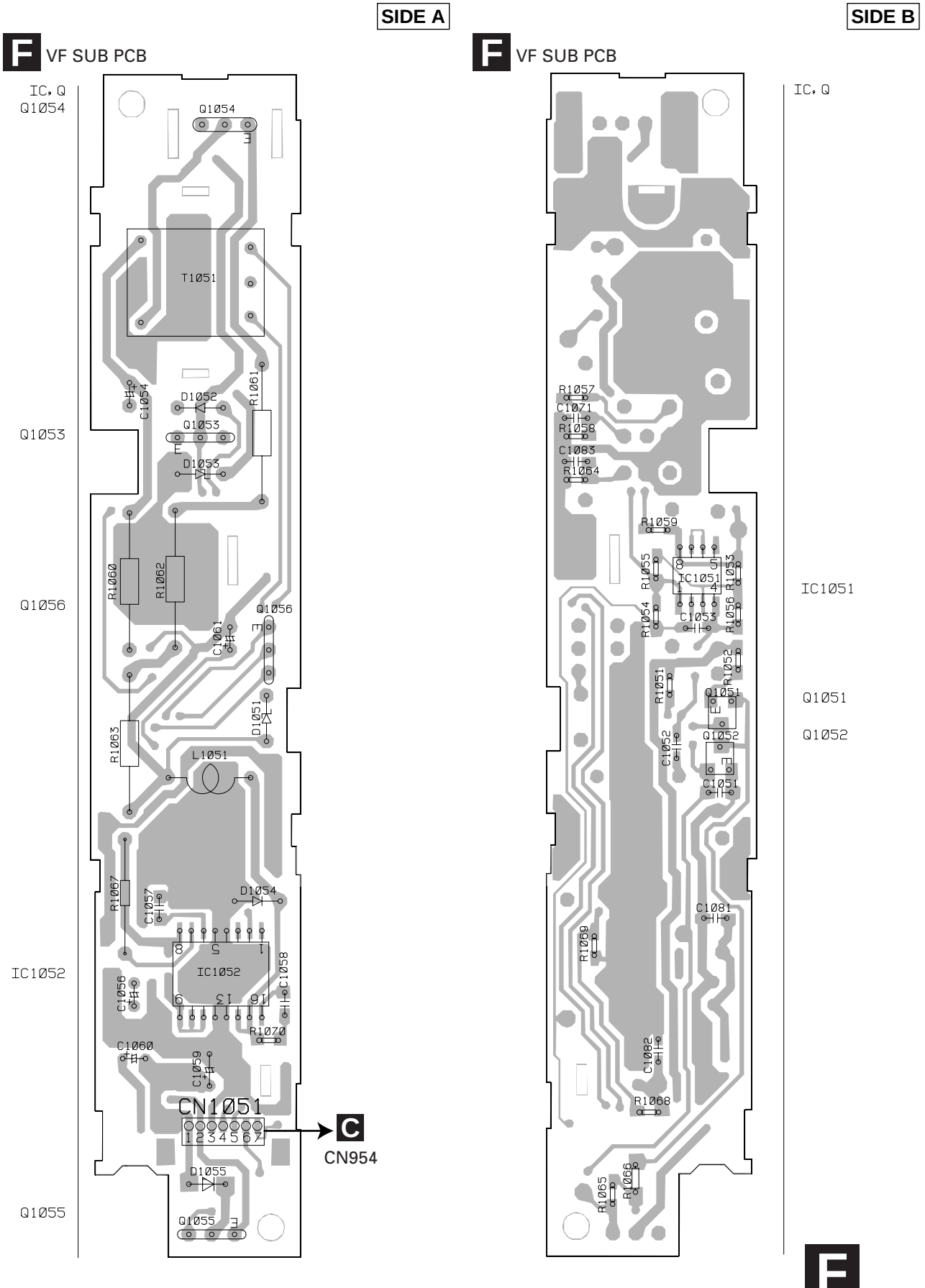
E CONNECTOR PCB



E CONNECTOR PCB



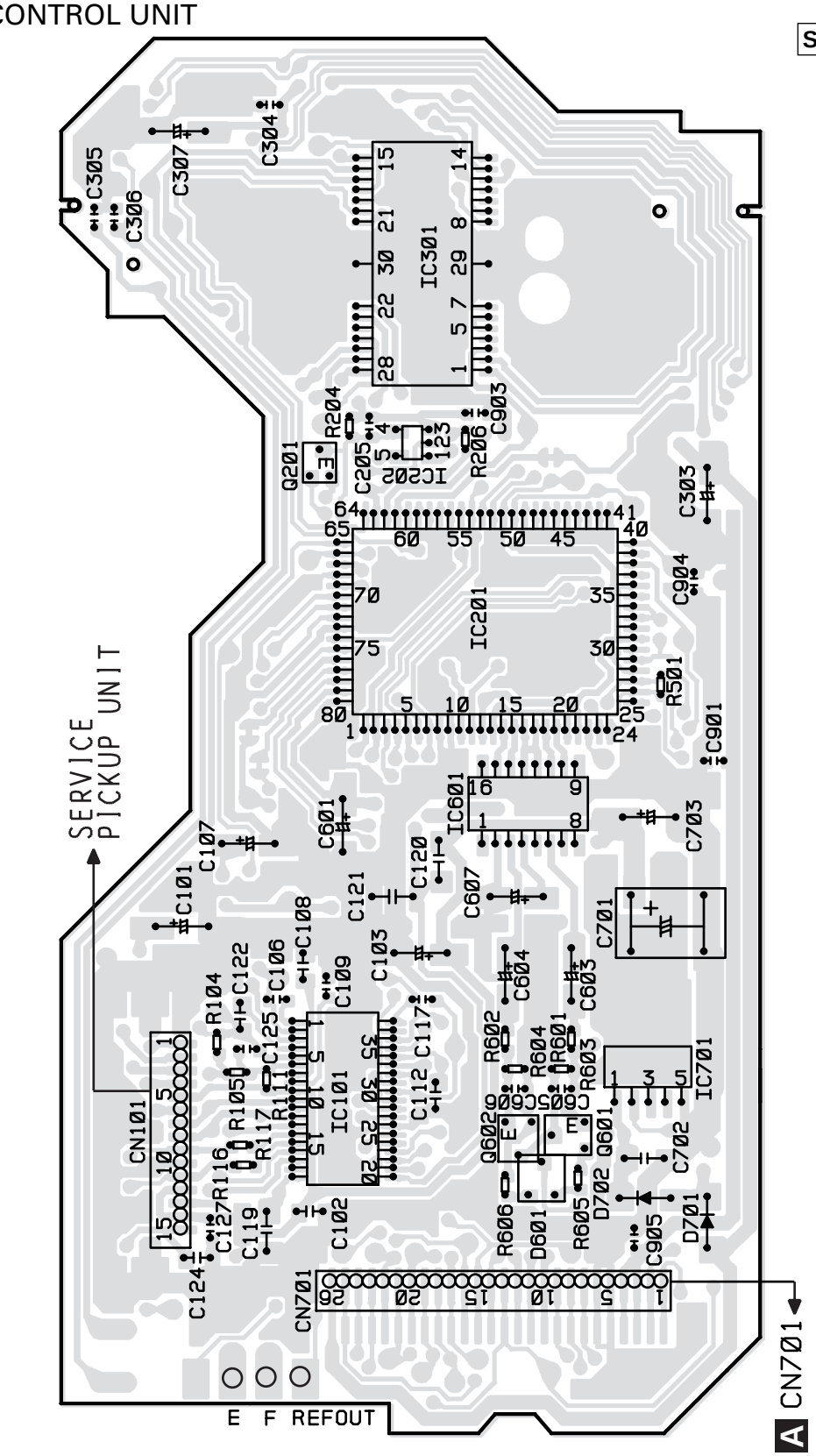
4.6 VF SUB PCB


SIDE A
SIDE B
F VF SUB PCB
F VF SUB PCB
IC, Q
Q1054
Q1053
Q1056
IC1052
Q1055
IC, Q
IC1051
Q1051
Q1052
Q1054
T1051
C1054
R1061
D1052
Q1053
D1053
R1060
R1062
C1061
Q1056
D1051
R1063
L1051
R1067
C1057
D1054
IC1052
C1056
C1058
R1070
C1060
C1059
CN1051
1 2 3 4 5 6 7
C
CN954
D1055
Q1055
R1057
C1071
R1058
C1083
R1064
R1059
R1055
IC1051
R1053
R1054
C1053
R1056
R1052
R1051
Q1051
Q1052
C1052
C1051
C1081
R1069
C1082
R1068
R1065
R1066

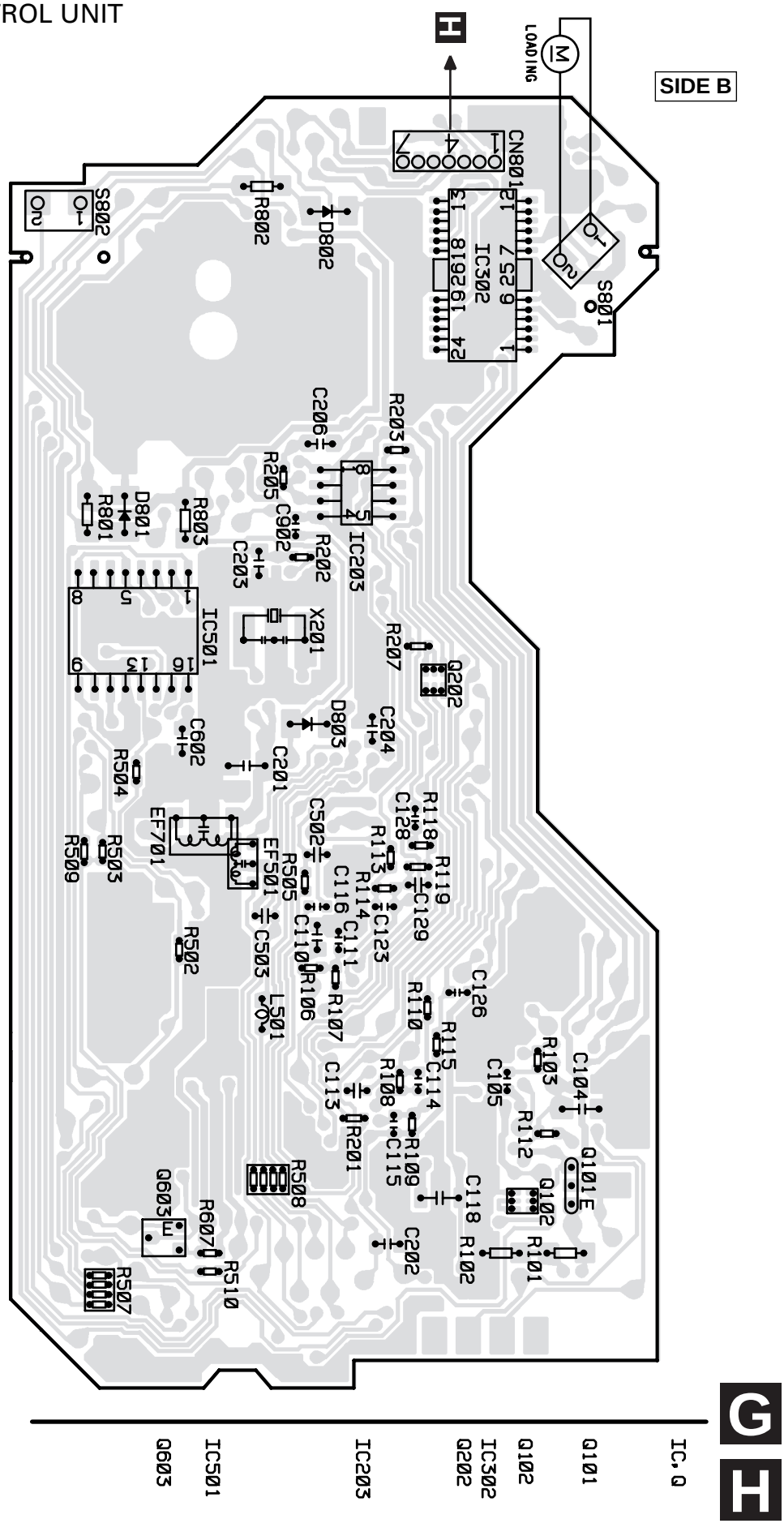
4.7 CD MECHANISM MODULE

G CONTROL UNIT

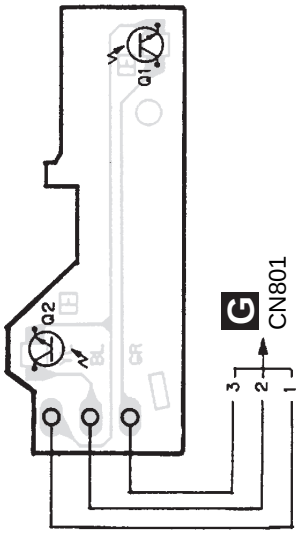
SIDE A



G CONTROL UNIT

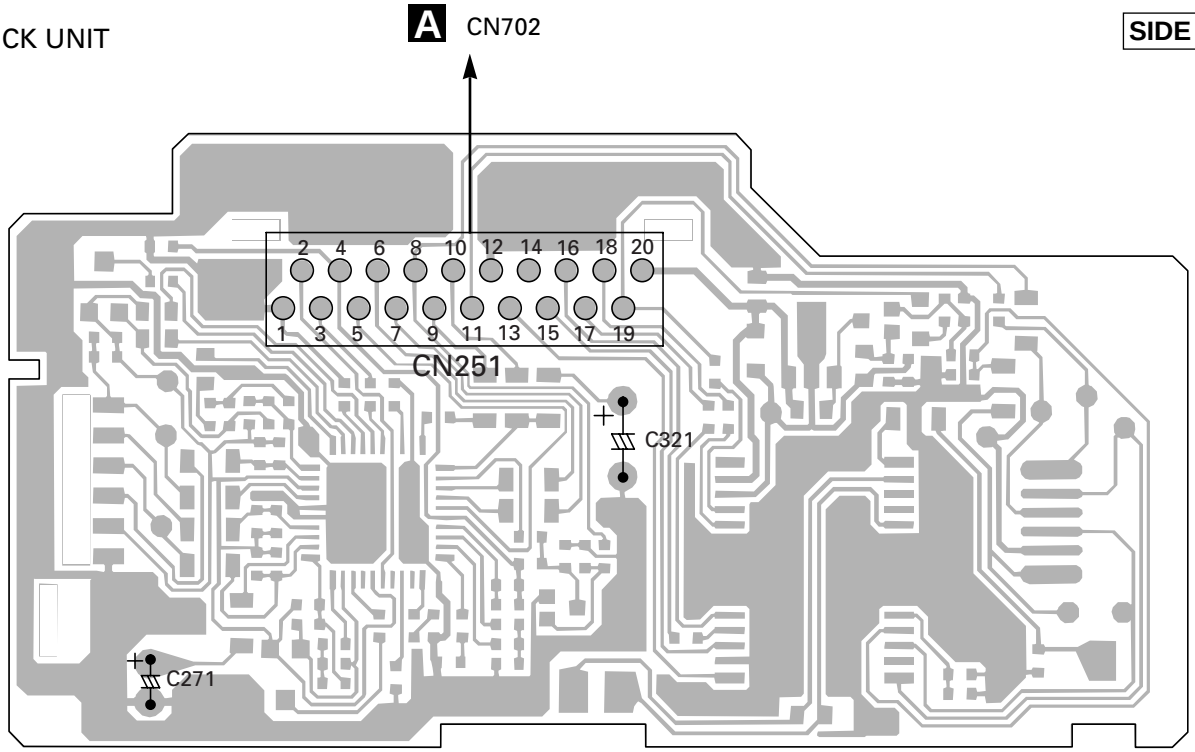


H DETECTOR PCB

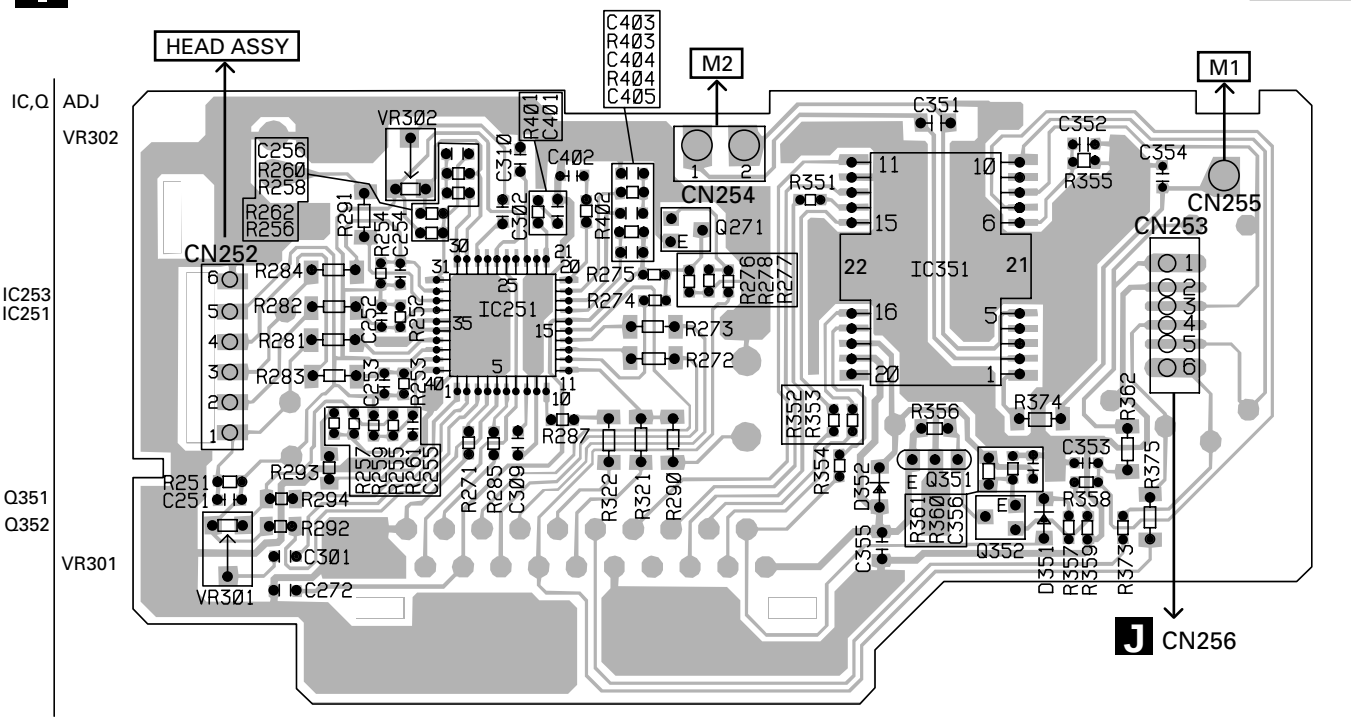


4.8 CASSETTE MECHANISM MODULE

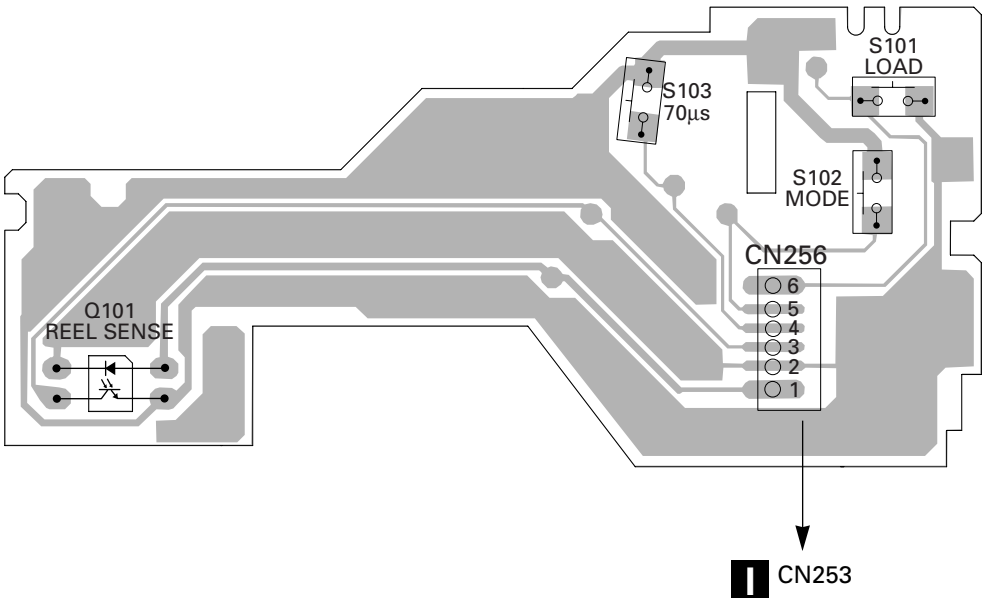
DECK UNIT



DECK UNIT



J SENSOR PCB


S101
LOAD
S103
70µs
S102
MODE
CN256
6
5
4
3
2
1
Q101
REEL SENSE
I CN253

5. ELECTRICAL PARTS LIST

NOTE:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

Chip Resistor

RS1/○S○○○J,RS1/○○S○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

A Unit Number : HWM0072(FH-2077ZF)
: HWM0081(FH-2177ZF)
Unit Name : Mother Unit

MISCELLANEOUS

=====Circuit Symbol & No.		===Part Name	Part No.
IC	101	IC	SN761027DL
IC	102	IC	SN761027DL
IC	212	IC	BA4558F-P
IC	213	IC	BA14741F
IC	215	IC	BA3308F
IC	301	IC	TDA7560
IC	302	IC	NJM2068MD
IC	303	IC	NJM2068MD
IC	304	IC	NJM2068MD
IC	501	IC	LC72146MQ2
IC	503	IC	PD6181B
IC	504	IC	PM4006B
IC	505	IC	SC14SU69F
IC	601	IC	PE5188A
IC	602	IC	PE5315A
IC	604	IC	TC7S86F
IC	605	IC	TC35096AF
IC	606	IC	S-29220A
IC	607	IC	NJM2904M
IC	801	IC	PAJ002A
IC	802	IC	PA2024A
Q	301	Transistor	DTC124EK
Q	302	Transistor	DTC124EK
Q	304	Transistor	FMC2A
Q	307	Transistor	FMC4A
Q	308	Transistor	FMC4A
Q	311	Transistor	FMC4A
Q	312	Transistor	FMC4A
Q	313	Transistor	2SC2458
Q	315	Transistor	DTC323TK
Q	316	Transistor	DTC323TK
Q	317	Transistor	DTC323TK
Q	318	Transistor	DTC323TK
Q	319	Transistor	DTA114TK
Q	320	Transistor	DTA114TK
Q	323	Transistor	DTC124TK
Q	501	Transistor	DTC114TK
Q	502	Transistor	2SC4081
Q	503	Transistor	2SK330
Q	505	Transistor	2SC2458
Q	506	Transistor	2SK330
Q	603	Transistor	2SB1238
Q	616	Transistor	2SA933S
Q	617	Transistor	DTC124EK
Q	618	Transistor	2SD2396
Q	619	Transistor	DTA114EK
Q	620	Transistor	DTC114EK
Q	621	Transistor	DTA124EK
Q	622	Transistor	DTC343TK
Q	623	Transistor	DTC343TK

=====Circuit Symbol & No.		===Part Name	Part No.
Q	625	Transistor	DTC124EK
Q	626	Transistor	DTC114TK
Q	627	Transistor	DTC114TK
Q	628	Transistor	DTC124TK
Q	629	Transistor	DTC114TK
Q	630	Transistor	DTA114TK
Q	801	Transistor	2SA933S
Q	802	Transistor	DTC124EK
Q	803	Transistor	2SA1358
Q	805	Transistor	2SA1358
Q	806	Transistor	2SC2458
Q	807	Transistor	2SC2458
D	201	Diode	MA8039(L)
D	301	Diode	MA3047(M)
D	302	Diode	HZS6L(B2)
D	303	Diode	1SS133
D	501	Diode	DAN202U
D	503	Diode	RD3R0ES
D	504	Diode	MA3047(M)
D	511	Diode	RD3R0ES
D	605	Diode	HZS9L(B1)
D	607	Chip Diode	MA151WK
D	613	Diode	1SS133
D	614	Diode	1SS133
D	616	Diode	1SS133
D	617	Diode	1SS133
D	618	Diode	1SS133
D	619	Diode	1SS133
D	620	Diode	1SS133
D	621	Diode	1SS133
D	622	Diode	1SS133
D	623	Diode	DAN202U
D	801	Diode	ERC05-10B
D	802	Diode	ERA15-02VH
D	803	Diode	1SS133
D	804	Diode	1SS133
D	1601	Diode	1SS352
L	403	Inductor	LCTB4R7K2125
L	501	Ferri-Inductor	LAU1R0M
L	502	Inductor	LCTB2R2K2125
L	503	Ferri-Inductor	CTF-157
L	504	Inductor	LCTB2R2K2125
L	505	Inductor	LCTB2R2K2125
L	508	Inductor	LCTB2R2K2125
L	601	Inductor	LCTB2R2K2125
L	602	Inductor	LCTB2R2K2125
L	801	Choke Coil 600mH	CTH1171
TH	601	Thermistor	CCX1015
X	501	Crystal Resonator 7.2MHz	CSS1334
X	502	Crystal Resonator 4.332MHz	CSS1056
X	601	Crystal Resonator 4.92MHz	CSS1398
X	602	Ceramic Resonator 4.194MHz	CSS1071
X	603	Radiator 32.768kHz	CSS1319
EF	801	EMI Filter	CCG1006
AR	402	Arrester	DSP-201M

RESISTORS

Circuit Symbol & No.	Part Name	Part No.
R 103		RS1/10S911J
R 104		RS1/10S911J
R 105		RS1/10S182J
R 106		RS1/10S182J
R 107		RS1/10S363J
R 108		RS1/10S363J
R 109		RS1/10S103J
R 110		RS1/10S103J
R 111		RS1/10S103J
R 112		RS1/10S103J
R 113		RS1/10S0R0J
R 114		RS1/10S0R0J
R 115		RS1/10S473J
R 116		RS1/10S473J
R 117		RS1/10S473J
R 118		RS1/10S473J
R 119		RS1/10S473J
R 120		RS1/10S473J
R 127		RS1/10S221J
R 128		RS1/10S221J
R 139		RS1/10S151J
R 140		RS1/10S151J
R 145		RS1/10S182J
R 146		RS1/10S182J
R 147		RS1/10S103J
R 148		RS1/10S103J
R 301		RS1/10S103J
R 302		RS1/10S222J
R 303		RS1/10S101J
R 304		RS1/10S153J
R 305		RS1/10S103J
R 308		RS1/10S182J
R 309		RS1/10S182J
R 310		RS1/10S333J
R 311		RS1/10S333J
R 312		RS1/10S753J
R 313		RS1/10S753J
R 314		RS1/10S753J
R 315		RS1/10S753J
R 316		RS1/10S333J
R 317		RS1/10S333J
R 318		RS1/10S333J
R 319		RS1/10S333J
R 320		RS1/10S753J
R 321		RS1/10S753J
R 322		RS1/10S152J
R 323		RS1/10S222J
R 324		RS1/10S151J
R 329		RS1/10S331J
R 330		RS1/10S102J
R 331		RS1/10S473J
R 333		RS1/10S333J
R 334		RS1/10S392J
R 337		RS1/10S102J
R 345		RS1/10S223J
R 346		RS1/10S223J
R 347		RS1/10S223J
R 348		RS1/10S223J
R 361		RS1/10S103J
R 362		RS1/10S473J
R 363		RS1/10S103J
R 364		RS1/10S432J
R 366		RS1/10S103J
R 417		RS1/10S0R0J
R 501		RS1/10S153J
R 502		RS1/16S223J
R 503		RS1/10S103J
R 504		RS1/10S472J
R 505		RS1/10S472J
R 506		RS1/16S102J
R 507		RS1/16S222J
R 508		RS1/10S102J
R 509		RS1/10S152J
R 510		RS1/10S103J
R 511		RS1/10S222J
R 512		RS1/10S102J
R 513		RS1/10S472J
R 514		RS1/10S472J
R 515		RS1/10S152J
R 516		RS1/10S222J
R 517		RS1/10S222J
R 519		RS1/10S473J
R 520		RS1/10S473J
R 521		RS1/10S473J
R 522		RS1/10S473J
R 523		RS1/16S473J
R 524		RS1/10S473J
R 525		RS1/10S473J
R 530		RD1/4PU101J
R 533		RS1/10S222J
R 535		RS1/10S681J
R 536		RS1/10S681J
R 537		RS1/10S681J
R 538		RS1/10S473J
R 539		RS1/10S473J
R 540		RS1/10S473J
R 542		RS1/10S473J
R 549		RS1/10S681J
R 550		RS1/10S102J
R 551		RS1/10S102J
R 553		RS1/10S102J
R 554		RS1/10S681J
R 555		RS1/10S105J
R 556		RS1/10S102J
R 558		RS1/10S473J
R 559		RS1/10S681J
R 561		RS1/10S473J
R 562		RS1/10S473J
R 564		RS1/10S0R0J
R 565		RS1/10S0R0J
R 582		RS1/10S103J
R 583		RS1/10S103J
R 589		RS1/10S222J
R 591		RS1/10S102J
R 592		RS1/10S102J
R 593		RS1/10S225J
R 594		RS1/10S473J
R 601		RS1/10S473J
R 602		RS1/10S473J
R 603		RS1/10S102J
R 604		RS1/10S102J
R 605		RS1/10S102J
R 622		RS1/16S102J
R 624		RS1/16S471J
R 629		RS1/10S102J
R 630		RS1/10S473J
R 631		RS1/10S102J
R 634		RS1/10S103J
R 635		RS1/10S473J
R 636		RS1/10S102J

=====Circuit Symbol & No.===Part Name			Part No.
R	637		RS1/10S102J
R	650		RS1/10S102J
R	659		RS1/10S472J
R	660		RS1/10S102J
R	661		RS1/10S102J
R	662		RS1/10S102J
R	665		RS1/10S102J
R	666		RS1/10S101J
R	667		RS1/10S101J
R	668		RS1/16S101J
R	669		RS1/10S101J
R	670		RS1/10S471J
R	673		RS1/10S473J
R	674		RS1/10S471J
R	675		RS1/10S472J
R	676		RS1/10S472J
R	677		RS1/10S471J
R	695		RS1/16S102J
R	697		RS1/10S472J
R	698		RS1/10S681J
R	699		RS1/10S102J
R	701		RS1/16S102J
R	702		RS1/16S681J
R	711		RS1/10S102J
R	712		RS1/10S102J
R	713		RS1/10S102J
R	714		RS1/10S102J
R	715		RS1/10S102J
R	716		RS1/10S102J
R	717		RS1/10S102J
R	718		RS1/10S433J
R	719		RS1/10S473J
R	720		RS1/10S473J
R	722		RS1/10S473J
R	723		RS1/10S473J
R	724		RS1/10S473J
R	725		RS1/16S223J
R	726		RS1/16S223J
R	728		RS1/16S222J
R	729		RS1/16S222J
R	730		RS1/10S103J
R	731		RS1/10S184J
R	732		RS1/10S152J
R	733		RS1/10S472J
R	734		RS1/10S473J
R	735		RS1/10S473J
R	737		RS1/10S473J
R	754		RS1/10S473J
R	755		RS1/10S473J
R	756		RS1/10S273J
R	757		RS1/10S104J
R	758		RS1/10S104J
R	759		RS1/10S472J
R	760		RS1/10S273J
R	761		RS1/10S473J
R	776		RS1/10S103J
R	777		RS1/8S201J
R	778		RD1/4PU221J
R	779		RS1/10S221J
R	780		RS1/10S472J
R	781		RS1/10S103J
R	782		RS1/10S223J
R	783		RS1/10S471J
R	784		RS1/10S102J
R	785		RS1/10S473J

=====Circuit Symbol & No.===Part Name			Part No.
R	786		RS1/10S392J
R	787		RS1/10S472J
R	788		RS1/10S471J
R	789		RS1/10S471J
R	790		RS1/10S471J
R	791		RS1/10S471J
R	792		RS1/10S102J
R	793		RS1/10S472J
R	794		RS1/10S103J
R	795		RS1/16S471J
R	796		RS1/16S471J
R	797		RS1/16S471J
R	798		RS1/16S471J
R	799		RS1/10S472J
R	801		RS1/10S152J
R	802		RS1/10S103J
R	803		RS1/10S103J
R	804		RS1/10S822J
R	805		RS1/10S823J
R	806		RS1/10S823J
R	807		RS1/10S103J
R	808		RS1/10S333J
R	809		RS1/10S363J
R	810		RS1/10S103J
R	811		RS1/4S4R7J
R	812		RS1/10S102J
R	814		RS1/10S394J
R	815		RS1/10S274J
R	817		RS1/10S472J
R	818		RS1/10S104J
R	819		RS1/4S4R7J
R	820		RS1/10S152J
R	821		RS1/10S222J
R	822		RS1/10S102J
R	823		RS1/10S105J
R	824		RS1/10S473J
R	825		RS1/10S103J
R	826		RS1/10S273J
R	1221		RS1/10S103J
R	1222		RS1/10S103J
R	1223		RS1/10S103J
R	1224		RS1/10S103J
R	1226		RS1/16S103J
R	1227	(FH-2077ZF)	RS1/16S182J
R	1227	(FH-2177ZF)	RS1/16S512J
R	1228		RS1/16S101J
R	1241		RS1/16S0R0J
R	1243		RS1/16S473J
R	1245		RS1/16S473J
R	1247		RS1/10S133J
R	1249		RS1/10S361J
R	1251		RS1/10S392J
R	1253		RS1/10S221J
R	1255		RS1/10S752J
R	1257		RS1/16S684J
R	1259		RS1/16S0R0J
R	1505		RD1/4PU0R0J
R	1506		RD1/4PU0R0J
R	1615		RS1/10S101J
R	1616		RS1/10S103J
R	1617		RS1/10S822J
R	1618		RS1/10S103J
R	1619		RS1/10S473J
R	1620		RS1/10S182J
R	1621		RS1/10S182J

=====Circuit Symbol & No.===Part Name			Part No.
R	1622		RS1/10S102J
R	1623		RS1/10S102J
R	1631		RA4C102J
R	1632		RA4C102J
R	1633		RA4C102J
R	1634		RA4C102J
R	1635		RA4C102J
R	1636		RA4C102J
R	1637		RA4C682J
R	1638		RA4C102J
R	1640		RA4C102J
R	1641		RA4C102J
R	1642		RA4C222J
R	1643		RA4C473J
R	1644		RA4C473J
R	1645		RA4C221J
R	1648		RA4C102J
R	1649		RS1/10S220J
R	1650		RS1/16S102J
R	1651		RS1/16S102J
R	1652		RS1/16S102J
R	1653		RS1/16S102J
R	1654		RS1/10S512J
R	1655		RS1/10S512J
R	1656		RS1/10S473J

CAPACITORS

C	103		CEJANP100M16
C	104		CEJANP100M16
C	105		CEAL1R0M50
C	106		CEAL1R0M50
C	107		CEJANP100M16
C	108		CEJANP100M16
C	111		CKSQYB103K50
C	112		CKSQYB103K50
C	113		CKSQYB561K50
C	114		CKSQYB561K50
C	115		CEJANP3R3M25
C	116		CEJANP3R3M25
C	119		CKSQYB563K16
C	120		CKSQYB563K16
C	121		CEJANPR33M50
C	122		CEJANPR33M50
C	123		CEAL220M6R3
C	124		CEAL2R2M50
C	125		CKSQYB683K16
C	126		CKSQYB154K16
C	127		CEAL101M10
C	128		CEJANP100M16
C	129		CEJANP100M16
C	130		CEJANP100M16
C	131		CEJANP100M16
C	138		CEAL2R2M50
C	139		CEAL220M6R3
C	140		CKSQYB683K16
C	143		CEALNP1R0M50
C	144		CEALNP1R0M50
C	145		CEALNP1R0M50
C	146		CEALNP1R0M50
C	147		CEALNP1R0M50
C	148		CEALNP1R0M50
C	149		CEALNP1R0M50

=====Circuit Symbol & No.===Part Name			Part No.
C	150		CEALNP1R0M50
C	151		CEALNP1R0M50
C	152		CEALNP1R0M50
C	153		CEALNP1R0M50
C	154		CEALNP1R0M50
C	155		CEALNP1R0M50
C	156		CEALNP1R0M50
C	157		CEALNP1R0M50
C	158		CEALNP1R0M50
C	159		CEAL100M16
C	160		CEAL100M16
C	161		CEAL100M16
C	162		CEAL100M16
C	163		CEAL150M10
C	164		CEAL150M10
C	165		CEAL1R0M50
C	166		CEAL1R0M50
C	189		CKSQYB273K50
C	305		CKSQYB104K50
C	306		CEAL330M10
C	307		CEAL1R0M50
C	308		CEANL1R0M50
C	309		CEAL100M16
C	314		CEAL100M16
C	315		CEAL100M16
C	316		CEAL100M16
C	317		CEAL100M16
C	318		CCSQCH470J50
C	319		CCSQCH470J50
C	320		CEAL100M16
C	321		CEAL100M16
C	322		CCSQCH101J50
C	323		CEAL100M16
C	324		CEJA101M16
C	325		CEAL100M16
C	326		CEAL331M6R3
C	329		CCSQCH471J50
C	331		CCSQCH470J50
C	332		CCSQCH470J50
C	333		CCSQCH101J50
C	335		CKSYB105K16
C	336		CKSYB105K16
C	337		CKSYB105K16
C	338		CKSYB105K16
C	343		CEAL220M16
C	344		CEAL220M16
C	345		CEAL100M16
C	346		CEAL4R7M16
C	347		CEAL4R7M16
C	348		CCSQCH221J50
C	349		CKSQYB103K50
C	501		CEAL100M16
C	502		CKSQYB103K50
C	504		CKSRYB223K50
C	505		CCSQCH101J50
C	506		CEAL100M16
C	507		CCSQCH101J50
C	508		CCSQCH101J50
C	509		CCSQCH101J50
C	510		CKSQYB103K50

=====Circuit Symbol & No.		===Part Name	Part No.
C	511		CFTNA474J50
C	512	0.047µF/16V	CCG1008
C	513		CKSQYB103K50
C	514	4.7µF/16V	HCH0011
C	515		CKSQYB273K50
C	516		CKSQYB273K50
C	517		CKSQYB103K50
C	519		CKSQYB223K50
C	520		CKSRYB102K50
C	521		CCSQCH101J50
C	522		CCSQCH150J50
C	523		CCSQCH150J50
C	527		CKSQYB104K50
C	528		CCSQCH101J50
C	530		CKSQYB105K16
C	531		CKSQYB104K50
C	532		CKSQYB472K50
C	533		CEAL100M16
C	534		CKSQYB223K50
C	535		CKSQYB104K50
C	536		CCSQCH101J50
C	537		CKSQYB104K50
C	538		CEAL4R7M16
C	539		CKSQYB473K50
C	540		CKSQYB102K50
C	542		CCSQCH270J50
C	543		CCSQCH270J50
C	567		CCSRCH102J50
C	571		CEAL4R7M16
C	601		CCSQCH101J50
C	602		CCSQCH101J50
C	603		CCSQCH220J50
C	604		CCSQCH180J50
C	605		CCSQCH220J50
C	606		CCSQCH220J50
C	608		CCSQCH101J50
C	609		CCSQCH681J50
C	610		CCSQCH681J50
C	619		CEAL100M16
C	620		CEAL100M16
C	621		CEAL100M16
C	622		CCSQCH181J50
C	623		CCSQCH181J50
C	624		CASA100M6R3
C	635		CKSQYB104K16
C	636		CKSQYB473K50
C	637		CKSQYB103K50
C	646		CKSQYB473K50
C	651		CKSQYB103K50
C	652		CEAL1R0M50
C	653		CEAL1R0M50
C	654		CEAL101M10
C	656		CEAL100M16
C	657		CKSQYB103K50
C	659		CKSQYB103K50
C	660		CEAL2R2M50
C	661		CKSQYB472K50
C	662		CKSQYB472K50
C	663		CKSQYB104K16
C	801	4700µF/16V	CCH1188
C	802		CKSQYB103K50
C	803		CKSQYB103K50
C	804		CEAS102M16
C	805		CKSQYB473K50
C	806		CEAS471M6R3

=====Circuit Symbol & No.		===Part Name	Part No.
C	807		CASA100M6R3
C	808		CEAS331M10
C	809		CEAS221M10
C	810		CASA101M10
C	811		CASA470M10
C	812		CEAL101M10
C	813		CKSQYB472K50
C	814		CKSQYB103K50
C	815		CKSQYB102K50
C	816		CKSQYB102K50
C	817		CKSQYB102K50
C	818		CKSQYB102K50
C	819		CSZA220M10
C	821		CKSQYB102K50
C	822		CKSQYB102K50
C	823		CKSQYB102K50
C	824		CKSQYB102K50
C	825		CKSQYB102K50
C	826		CKSQYB102K50
C	827		CKSQYB102K50
C	828		CKSQYB102K50
C	829	2200µF/25V	CCL1027
C	1203	(FH-2077ZF)	CKSRYB683K25
C	1203	(FH-2177ZF)	CKSRYB563K16
C	1205	(FH-2077ZF)	CKSRYB393K125
C	1205	(FH-2177ZF)	CKSRYB273K50
C	1207		CEAL6R8M35
C	1209		CEJA221M6R3
C	1213		CEAL6R8M35
C	1214		CKSQYB102K50
C	1220		CKSQYB104K16

Compound Unit
Consists of EG PCB Connector PCB VF SUB PCB

D E F

Unit Number : HWM0074(FH-2077ZF)
: HWM0082(FH-2177ZF)
Unit Name : Compound Unit

MISCELLANEOUS

IC	201	IC(FH-2177ZF)	BA14741F
IC	202	IC	BA14741F
IC	203	IC	BA14741F
IC	204	IC	BA4558F-P
IC	205	IC	BA3308F
IC	206	IC(FH-2177ZF)	BA14741F
IC	207	IC(FH-2177ZF)	BA14741F
IC	208	IC	BA14741F
IC	209	IC	BA4558F-P
IC	210	IC	TC4066BF
IC	211	IC	BA3308F
IC	1001	IC	DS36277
IC	1051	IC	BA4558F-P
IC	1052	IC	SC33165ADWR2
Q	201	Transistor	2SA1037K
Q	202	Transistor	DTC114EK
Q	1011	Transistor	DTC143TK
Q	1012	Transistor	DTC143TK
Q	1013	Transistor	DTC124EK
Q	1014	Transistor	DTC124EK

Circuit Symbol & No.	Part Name	Part No.
Q 1015	Transistor	2SA1037K
Q 1051	Transistor	DTA124EK
Q 1052	Transistor	DTC143EK
Q 1053	Transistor	2SC3113
Q 1054	Transistor	2SD2396
Q 1055	Transistor	2SB1243
Q 1056	Transistor	2SD1859
D 1021	Diode	1SS133
D 1051	Diode	MTZ6R8J(B)
D 1052	Diode	1SS133
D 1053	Diode	MTZ5R1J(C)
D 1054	Diode	ERA83-006
D 1055	Diode	SC016-2
L 1051	Coil	CTH1202
T 1051	Transformer	CTT1067

RESISTORS

Circuit Symbol & No.	Part Name	Part No.
R 201		RS1/10S472J
R 202		RS1/10S472J
R 209	(FH-2177ZF)	RS1/10S683J
R 210	(FH-2177ZF)	RS1/10S683J
R 211	(FH-2177ZF)	RS1/10S122J
R 212	(FH-2177ZF)	RS1/10S122J
R 213	(FH-2177ZF)	RS1/10S101J
R 214	(FH-2177ZF)	RS1/10S101J
R 215	(FH-2077ZF)	RS1/10S272J
R 216	(FH-2077ZF)	RS1/10S272J
R 217		RS1/10S122J
R 218		RS1/10S122J
R 219		RS1/10S683J
R 220		RS1/10S683J
R 221		RS1/10S683J
R 222		RS1/10S683J
R 223		RS1/10S122J
R 224		RS1/10S122J
R 225	(FH-2177ZF)	RS1/10S682J
R 226	(FH-2177ZF)	RS1/10S682J
R 227		RS1/10S822J
R 228		RS1/10S822J
R 229		RS1/10S122J
R 230		RS1/10S122J
R 231		RS1/10S683J
R 232		RS1/16S683J
R 233		RS1/10S472J
R 234		RS1/10S472J
R 237		RS1/10S392J
R 238		RS1/10S392J
R 239		RS1/10S682J
R 240		RS1/10S682J
R 241		RS1/10S113J
R 242		RS1/10S113J
R 243		RS1/10S681J
R 244		RS1/10S681J
R 245		RS1/10S392J
R 246		RS1/10S392J
R 247		RS1/10S101J
R 248		RS1/10S101J
R 249		RS1/10S182J
R 250		RS1/10S182J
R 251		RS1/10S332J
R 252		RS1/10S332J
R 253		RS1/10S103J
R 254		RS1/10S103J
R 255		RS1/10S564J
R 256		RS1/16S0R0J
R 257		RS1/8S0R0J
R 261		RS1/10S472J
R 262		RS1/10S472J
R 269	(FH-2177ZF)	RS1/10S683J
R 270	(FH-2177ZF)	RS1/10S683J
R 271	(FH-2177ZF)	RS1/10S122J
R 272	(FH-2177ZF)	RS1/10S122J
R 273	(FH-2177ZF)	RS1/10S101J
R 274	(FH-2177ZF)	RS1/10S101J
R 275	(FH-2177ZF)	RS1/10S681J
R 276	(FH-2177ZF)	RS1/10S681J
R 277	(FH-2177ZF)	RS1/10S122J
R 278	(FH-2177ZF)	RS1/10S122J
R 279	(FH-2177ZF)	RS1/10S683J
R 280	(FH-2177ZF)	RS1/10S683J
R 281	(FH-2177ZF)	RS1/10S683J
R 282	(FH-2177ZF)	RS1/10S683J
R 283	(FH-2177ZF)	RS1/10S122J
R 284	(FH-2177ZF)	RS1/10S122J
R 285	(FH-2177ZF)	RS1/10S152J
R 286	(FH-2177ZF)	RS1/10S152J
R 287	(FH-2177ZF)	RS1/10S272J
R 288	(FH-2177ZF)	RS1/10S272J
R 289		RS1/10S122J
R 290		RS1/10S122J
R 291		RS1/10S683J
R 292		RS1/10S683J
R 293		RS1/16S472J
R 294		RS1/10S472J
R 297		RS1/10S222J
R 298		RS1/10S222J
R 299		RS1/10S392J
R 300		RS1/10S392J
R 301		RS1/16S0R0J
R 302		RS1/16S0R0J
R 1001		RS1/8S223J
R 1002		RS1/8S472J
R 1003		RS1/8S472J
R 1004		RS1/8S472J
R 1005		RS1/8S470J
R 1006		RS1/8S470J
R 1011		RS1/16S821J
R 1012		RS1/16S821J
R 1013		RS1/16S223J
R 1014		RS1/16S223J
R 1021		RD1/4PU103J
R 1022		RD1/4PU101J
R 1024		RS1/16S472J
R 1025		RS1/16S822J
R 1026		RS1/16S472J
R 1051		RS1/10S101J
R 1052		RS1/10S182J
R 1053		RS1/10S103J
R 1054		RS1/10S392J
R 1055		RS1/10S103J
R 1056		RS1/10S103J
R 1057		RS1/10S822J
R 1058		RS1/10S332J
R 1059		RS1/10S101J
R 1060		RS2LMF3R3J
R 1061		RS2LMF1R8J
R 1062		RS2LMF2R2J
R 1063		RS2PMF2R2J
R 1064		RS1/10S332J
R 1065		RS1/10S472J
R 1066		RS1/4S102J
R 1067		RS1PMFR47J

=====Circuit Symbol & No.		===Part Name	Part No.
R	1068		RS1/10S333J
R	1069		RS1/10S112J
R	1070		RS1/10S223J
R	1201		RS1/10S103J
R	1202		RS1/10S103J
R	1203		RS1/10S332J
R	1204		RS1/10S332J
R	1205		RS1/10S392J
R	1206		RS1/10S392J
R	1207		RS1/10S101J
R	1208		RS1/10S101J
R	1209		RS1/10S182J
R	1210		RS1/10S182J
R	1211		RS1/10S332J
R	1212		RS1/10S332J
R	1213		RS1/10S103J
R	1214		RS1/10S103J
R	1215		RS1/10S472J
R	1216		RS1/10S473J
R	1217		RS1/10S473J
R	1218		RS1/10S564J
R	1261		RS1/10S392J
R	1262		RS1/10S392J
R	1263		RS1/10S122J
R	1264		RS1/10S122J
R	1275	(FH-2177ZF)	RS1/10S221J
R	1276	(FH-2177ZF)	RS1/10S221J
R	1277	(FH-2077ZF)	RS1/10S822J
R	1278	(FH-2077ZF)	RS1/10S822J
R	1289	(FH-2077ZF)	RS1/16S0R0J
R	1290	(FH-2077ZF)	RS1/10S0R0J

CAPACITORS

C	201		CEAL220M16
C	202		CEAL220M16
C	203		CEAL220M16
C	204		CEAL220M16
C	209	(FH-2177ZF)	CKSQYB103K50
C	210	(FH-2177ZF)	CKSQYB103K50
C	211	(FH-2177ZF)	CKSQYB183K50
C	212	(FH-2177ZF)	CKSQYB183K50
C	213	(FH-2077ZF)	CKSQYB562K50
C	213	(FH-2177ZF)	CKSQYB473K50
C	214	(FH-2077ZF)	CKSQYB562K50
C	214	(FH-2177ZF)	CKSQYB473K50
C	215	(FH-2077ZF)	CKSRYB102K50
C	215	(FH-2177ZF)	CKSRYB823K16
C	216	(FH-2077ZF)	CKSRYB102K50
C	216	(FH-2177ZF)	CKSRYB823K16
C	217	(FH-2077ZF)	CKSRYB183K50
C	217	(FH-2177ZF)	CKSRYB102K50
C	218	(FH-2077ZF)	CKSRYB183K50
C	218	(FH-2177ZF)	CKSRYB102K50
C	221		CKSQYB183K50
C	222		CKSQYB183K50
C	223		CKSRYB223K50
C	224		CKSRYB223K50
C	229		CKSRYB334K16
C	230		CKSYB334K16
C	231		CKSRYB334K16
C	232		CKSRYB334K16
C	233		CEAL150M10
C	234		CEAL150M10
C	235		CEJA221M6R3
C	236		CEJA221M6R3
C	239		CKSQYB102K50
C	240		CEAL3R3M50
C	255	(FH-2177ZF)	CKSRYB123K50

=====Circuit Symbol & No.		===Part Name	Part No.
C	256	(FH-2177ZF)	CKSRYB123K50
C	257	(FH-2177ZF)	CKSQYB103K50
C	258	(FH-2177ZF)	CKSQYB103K50
C	259	(FH-2177ZF)	CKSQYB184K16
C	260	(FH-2177ZF)	CKSQYB184K16
C	261	(FH-2177ZF)	CKSRYB683K25
C	262	(FH-2177ZF)	CKSRYB683K25
C	263	(FH-2177ZF)	CKSRYB102K50
C	264	(FH-2177ZF)	CKSRYB102K50
C	265	(FH-2177ZF)	CKSQYB123K50
C	266	(FH-2177ZF)	CKSQYB123K50
C	267	(FH-2077ZF)	CKSQYB103K50
C	267	(FH-2177ZF)	CKSQYB223K50
C	268	(FH-2077ZF)	CKSQYB103K50
C	268	(FH-2177ZF)	CKSQYB223K50
C	269	(FH-2077ZF)	CKSQYB183K50
C	269	(FH-2177ZF)	CKSQYB273K50
C	270	(FH-2077ZF)	CKSQYB183K50
C	270	(FH-2177ZF)	CKSQYB273K50
C	275		CKSRYB334K16
C	276		CKSRYB334K16
C	277		CKSRYB334K16
C	278		CKSRYB334K16
C	279		CEAL150M10
C	280		CEAL150M10
C	281		CEJA221M6R3
C	282		CEJA221M6R3
C	285		CKSQYB102K50
C	286		CEAL3R3M50
C	1001		CEAL220M10
C	1002		CKSRYB222K50
C	1003		CKSRYB222K50
C	1004		CCSRCH181J50
C	1005		CCSRCH181J50
C	1051		CKSQYB102K50
C	1052		CKSQYB103K50
C	1053		CKSQYB562K50
C	1054		CEJA101M16
C	1056		CASA6R8M30
C	1057		CKSQYB471K50
C	1058		CKSQYB223K50
C	1059		CEAS101M50
C	1061		CEAL100M6R3
C	1071		CKSQYB332K50
C	1081		CKSQYB102K50
C	1082		CKSQYB102K50
C	1083		CKSQYB102K50
C	1223	(FH-2077ZF)	CKSQYB103K50
C	1223	(FH-2177ZF)	CKSQYB562K50
C	1224	(FH-2077ZF)	CKSQYB103K50
C	1224	(FH-2177ZF)	CKSQYB562K50

C Unit Number : HWM8124
Unit Name : Keyboard Unit

MISCELLANEOUS

IC	901	IC	LC75725E
Q	901	Transistor	2SC2882
Q	902	Transistor	UN2111
Q	903	Transistor	UN221D
Q	904	Transistor	UN2111
Q	905	Transistor	UN221D
Q	906	Transistor	UN2111
Q	907	Transistor	UN221D
Q	908	Transistor	2SA1037K
Q	909	Transistor	UN221D

Circuit Symbol & No.	Part Name	Part No.
Q 910	Transistor	UN2111
Q 911	Transistor	UN221D
Q 912	Transistor	UN2111
Q 913	Transistor	UN221D
Q 914	Transistor	UN2111
Q 915	Transistor	UN221D
Q 916	Transistor	UN2111
Q 917	Transistor	UN221D
Q 918	Transistor	DTA124EK
Q 919	Transistor	DTC124EK
Q 920	Transistor	DTC124EK
D 901	Diode	UDZS7R5(B)
D 902	Chip Diode	MA151WK
D 907	LED	CL190UBX
D 950	LED	CL190UBX
D 951	LED	CL190UBX
D 952	LED	CL190UBX
D 953	LED	CL190UBX
D 954	LED	CL190UBX
D 955	LED	CL190UBX
D 956	LED	CL190UBX
D 957	LED	CL190UBX
D 958	LED	CL190UBX
D 959	LED	CL190UBX
D 960	LED	CL190UBX
D 961	LED	CL190UBX
D 962	LED	CL190UBX
D 963	LED	CL190UBX
D 964	LED	CL190UBX
D 965	LED	CL190UBX
D 966	LED	CL190UBX
D 967	LED	CL190UBX
D 968	LED	CL190UBX
D 969	LED	CL190UBX
D 970	LED	CL190UBX
D 971	LED	CL190UBX
D 974	LED	CL190UBX
D 975	LED	CL190UBX
D 976	LED	CL190UBX
D 977	LED	CL190UBX
D 978	LED	CL190UBX
D 979	LED	CL190UBX
D 981	LED	CL190UBX
D 982	LED	CL190UBX
D 983	LED	CL190UBX
D 985	LED	CL190UBX
D 986	LED	CL190UBX
D 988	LED	CL190UBX
D 989	Diode	UDZS3R9(B)
VR 901	Encoder	CSD1070
VR 902	Switch	CSD1071
	VF	HAW1359

RESISTORS

Circuit Symbol & No.	Part Name	Part No.
R 901		RS1/16S562J
R 902		RS1/4S121J
R 903		RS1/16S682J
R 904		RS1/4S103J
R 905		RS1/16S393J
R 906		RS1/16S122J
R 907		RS1/16S122J
R 908		RS1/16S122J
R 909		RS1/16S122J
R 910		RS1/16S103J
R 911		RS1/16S103J
R 912		RS1/16S122J
R 913		RS1/16S122J
R 914		RS1/16S122J
R 915		RS1/16S122J
R 916		RS1/16S223J
R 920		RS1/16S103J
R 921		RS1/16S103J
R 922		RS1/16S103J
R 923		RS1/16S103J
R 924		RS1/16S103J
R 925		RS1/16S103J
R 926		RS1/16S103J
R 927		RS1/16S103J
R 930		RS1/16S393J
R 931		RS1/16S393J
R 932		RS1/16S393J
R 933		RS1/16S393J
R 934		RS1/16S393J
R 935		RS1/16S393J
R 936		RS1/16S393J
R 937		RS1/16S393J
R 938		RS1/16S393J
R 939		RS1/16S393J
R 940		RS1/16S393J
R 941		RS1/16S393J
R 942		RS1/16S393J
R 943		RS1/16S393J
R 944		RS1/16S393J
R 945		RS1/16S393J
R 946		RS1/16S393J
R 947		RS1/16S393J
R 948		RS1/16S393J
R 949		RS1/16S393J
R 951		RS1/16S0R0J
R 952		RS1/16S0R0J
R 953		RS1/16S0R0J
R 954		RS1/16S0R0J
R 955		RS1/16S0R0J
R 956		RS1/16S0R0J
R 957		RS1/16S0R0J
R 958		RS1/16S0R0J
R 959		RS1/16S0R0J
R 960		RS1/16S0R0J
R 961		RS1/16S102J
R 962		RS1/16S0R0J
R 963		RS1/16S0R0J
R 964		RS1/16S0R0J
R 965		RS1/16S472J
R 966		RS1/16S0R0J
R 967		RS1/16S151J
R 968		RS1/16S0R0J
R 970		RS1/16S0R0J
R 971		RS1/16S0R0J
R 973		RS1/16S0R0J
R 974		RS1/4S121J
R 976		RS1/16S393J
R 977		RS1/16S393J
R 978		RS1/16S393J
R 979		RS1/16S393J
R 989		RS1/4S103J
R 991		RS1/16S393J
R 994		RS1/16S393J
R 995		RS1/16S393J
R 996		RS1/16S393J

=====Circuit Symbol & No.	===Part Name	Part No.
R 997		RS1/16S393J
R 998		RS1/16S393J
R 999		RS1/16S393J
R 1901		RS1/16S471J
R 1902		RS1/16S471J
R 1903		RS1/16S471J
R 1904		RS1/16S471J
R 1906		RS1/16S102J
R 1907		RS1/16S102J
R 1908		RS1/16S102J
R 1909		RS1/16S102J
R 1912		RS1/16S102J
R 1913		RS1/16S102J
R 1914		RS1/16S102J
R 1915		RS1/16S102J
R 1916		RS1/16S332J
R 1951		RS1/16S820J
R 1952		RS1/16S820J
R 1953		RS1/16S820J
R 1954		RS1/16S820J
R 1955		RS1/16S820J
R 1956		RS1/16S820J
R 1957		RS1/16S820J
R 1958		RS1/16S820J
R 1959		RS1/16S820J
R 1960		RS1/16S820J
R 1962		RS1/16S681J
R 1963		RS1/16S820J
R 1964		RS1/16S820J
R 1966		RS1/16S820J
R 1967		RS1/16S181J
R 1968		RS1/16S820J
R 1970		RS1/16S820J
R 1971		RS1/16S820J
R 1973		RS1/16S181J

CAPACITORS

C 901		CCSRCH220J50
C 902		CKSRYB103K50
C 903		CKSRYB103K50
C 904		CKSRYB104K16
C 906		CKSRYB102K50
C 907		CKSRYB102K50
C 910		CKSRYB102K50
C 911		CKSRYB104K16
C 912		CKSRYB104K16
C 913		CKSRYB104K16
C 914		CKSRYB104K16
C 915		CKSRYB104K16
C 916		CKSRYB104K16
C 917		CKSRYB104K16
C 918		CKSRYB104K16
C 919		CKSRYB104K16
C 920		CKSRYB104K16
C 921		CKSRYB104K16
C 922		CKSRYB104K16
C 923		CKSRYB104K16
C 924		CKSRYB104K16
C 925		CKSRYB104K16
C 926		CKSRYB104K16
C 927		CKSRYB104K16
C 928		CKSRYB104K16
C 929		CKSRYB104K16
C 930		CKSRYB104K16
C 931		CKSRYB104K16
C 932		CKSRYB104K16
C 933		CKSRYB104K16

=====Circuit Symbol & No.	===Part Name	Part No.
C 934		CKSRYB104K16
C 935		CKSRYB104K16
C 936		CKSRYB104K16
C 937		CKSRYB104K16
C 938		CKSRYB104K16
C 939		CKSRYB104K16
C 940		CKSRYB104K16
C 941		CKSRYB104K16
C 942		CKSRYB104K16
C 943		CKSRYB104K16
C 944		CKSRYB104K16
C 945		CKSRYB104K16
C 952		CCSRCH150J50

B Unit Number : CWE1428
Unit Name : Tuner Unit

MISCELLANEOUS

IC 1	IC	PA4023B
IC 2	IC	PA4024A
Q 1	Transistor	2SC2712
Q 3	FET	3SK263
Q 31	Transistor	2SC2712
Q 151	Transistor	DTC124EU
Q 201	Transistor	FC12
Q 203	Transistor	DTC124EU
Q 232	Transistor	2SC4116
D 3	Diode	1SV251
D 4	Diode	1SV250
D 5	Diode	KV1410
D 6	Diode	MA157
D 7	Diode	KV1410
D 8	Diode	KV1410
D 201	Diode	MA157
D 202	Diode	1SV251
D 231	Diode	SVC203CP
L 1	Inductor	LCTBR12K2125
L 2	Coil	CTC1145
L 3	Inductor	LCTB4R7K2125
L 4	Coil	CTC1131
L 5	Coil	CTC1147
L 51	Ferri-Inductor	LAU150K
L 52	Coil	CTC1136
L 201	Ferri-Inductor	LAU4R7K
L 202	Ferri-Inductor	LAU330K
L 203	Inductor	CTF1371
L 208	Inductor	LAU390K
L 209	Ferri-Inductor	LAU680K
L 210	Coil	CTB1103
T 31	Coil	CTE1116
T 231	Coil	CTB1106
TC 1		CCL1046
CF 25	Ceramic Filter	CTF1292
CF 51	Ceramic Filter	CTF1292
CF 52	Ceramic Filter	CTF1292
CF 53	Ceramic Filter	CTF1292
CF 230	Crystal Filter	CTF1262
CF 232	Ceramic Filter	CTF1348
X 151	Radiator 918.5Hz	CSS1365
X 231	Crystal 10.26MHz	CSS1111
VR 101	Semi-fixed 15kΩ(B)	CCP1230
VR 151	Semi-fixed 10kΩ(B)	CCP1229
VR 154	Semi-fixed 150kΩ(B)	CCP1236
VR 156	Semi-fixed 68kΩ(B)	CCP1235

RESISTORS

=====Circuit Symbol & No.===Part Name		Part No.
R	3	RS1/16S223J
R	4	RS1/16S101J
R	5	RS1/16S101J
R	6	RS1/16S101J
R	7	RS1/10S331J
R	8	RS1/16S473J
R	9	RS1/16S473J
R	10	RS1/16S223J
R	11	RS1/16S124J
R	12	RS1/16S474J
R	15	RS1/16S271J
R	16	RS1/16S104J
R	17	RS1/16S473J
R	18	RS1/16S473J
R	19	RS1/16S154J
R	27	RS1/16S0R0J
R	31	RS1/16S470J
R	32	RS1/16S912J
R	33	RS1/16S912J
R	34	RS1/16S331J
R	35	RS1/16S331J
R	39	RS1/16S0R0J
R	51	RS1/16S331J
R	55	RS1/16S102J
R	56	RS1/16S823J
R	61	RS1/16S392J
R	62	RS1/16S273J
R	103	RS1/16S333J
R	104	RS1/16S334J
R	105	RS1/16S683J
R	107	RS1/16S222J
R	152	RS1/16S393J
R	155	RS1/16S303J
R	157	RS1/10S203J
R	160	RS1/16S222J
R	161	RS1/16S563J
R	162	RS1/16S225J
R	163	RS1/16S222J
R	164	RS1/16S473J
R	165	RS1/16S102J
R	202	RS1/16S223J
R	203	RS1/16S225J
R	204	RS1/16S103J
R	205	RS1/16S471J
R	206	RS1/16S220J
R	207	RS1/16S101J
R	208	RS1/16S102J
R	209	RS1/16S0R0J
R	214	RS1/16S563J
R	215	RS1/16S473J
R	217	RS1/16S682J
R	220	RS1/10S0R0J
R	231	RS1/16S242J
R	232	RS1/16S473J
R	233	RS1/16S0R0J
R	234	RS1/16S0R0J
R	237	RS1/16S912J
R	238	RS1/16S104J
R	239	RS1/16S104J
R	240	RS1/16S392J
R	241	RS1/16S202J
R	242	RS1/16S103J
R	243	RS1/16S153J
R	244	RS1/16S103J
R	247	RS1/10S153J

CAPACITORS

=====Circuit Symbol & No.===Part Name		Part No.
C	1	CCSRCH220J50
C	2	CKSRYB222K50
C	3	CCSRCH6R0D50
C	5	CKSRYB222K50
C	6	CKSQYB473K16
C	7	CKSQYB473K16
C	8	CKSQYB104K16
C	9	CCSRCJ3R0C50
C	10	CEJA1R0M50
C	11	CCSRCH470J50
C	12	CCSRCH820J50
C	13	CKSRYB222K50
C	14	CCSRCH4R0C50
C	16	CCSRCH120J50
C	17	CKSRYB222K50
C	18	CKSRYB103K25
C	19	CKSRYB222K50
C	20	CKSRYB222K50
C	21	CEJA100M16
C	22	CCSRRH100D50
C	23	CCSRRH120J50
C	24	CKSRYB103K25
C	30	CCSRRH201J50
C	31	CKSRYB103K25
C	32	CKSQYB473K16
C	33	CCSRCK2R0C50
C	35	CCSRCH270J50
C	36	CCSRCH120J50
C	40	CKSRYB222K50
C	41	CKSQYB104K16
C	51	CKSRYB223K25
C	52	CKSRYB103K25
C	54	CCSRCH470J50
C	55	CKSQYB223K25
C	56	CKSQYB104K16
C	57	CKSRYB472K50
C	58	CEJA330M10
C	59	CKSRYB103K25
C	61	CCSRCH270J50
C	62	CKSRYB103K25
C	63	CEJAR22M50
C	65	CKSQYB104K16
C	101	CEJANP100M10
C	102	CKSRYB182K50
C	103	CKSQYB682K50
C	104	CEJA2R2M50
C	105	CKSRYB103K25
C	106	CCSRCH151J50
C	107	CKSRYB103K25
C	151	CKSRYB392K50
C	152	CKSQYB104K16
C	153	CEJA3R3M50
C	154	CKSQYB104K16
C	157	CEJA3R3M50
C	158	CKSYB474K16
C	159	CEJA220M6R3
C	160	CKSQYB104K16
C	161	CKSQYB104K16
C	162	CEJA3R3M50
C	163	CKSRYB102K50
C	165	CCSRCH100D50
C	201	CKSRYB103K25
C	202	CCSRCH100D50
C	203	CKSRYB332K50
C	204	CKSQYB473K16

=====Circuit Symbol & No.	===Part Name	Part No.
C 205		CKSQYB473K16
C 206		CKSQYB103K25
C 207		CCSRCH120J50
C 211		CCSRCH560J50
C 212		CEJA101M10
C 213		CKSRYB103K25
C 215		CCSRCH680J50
C 216		CCSRCH101J50
C 217		CEJAR47M50
C 219		CKSRYB223K25
C 220		CKSRYB103K25
C 221		CKSRYB103K25
C 230		CKSQYB104K16
C 231		CCSRCH330J50
C 232		CCSRCH150J50
C 233		CKSRYB103K25
C 234		CEJA330M10
C 235		CKSRYB332K50
C 236		CKSQYB473K16
C 237		CCSRUJ221J50
C 239		CKSRYB103K25
C 240		CKSYB105K16
C 241		CKSQYB104K16
C 242		CEJAR47M50
C 243		CEJAR33M50
C 244		CKSQYB473K16
C 245		CKSQYB153K25
C 246		CKSQYB333K25
C 250		CCSRCJ3R0C50

G Unit Number : CWX2016
Unit Name : Control Unit

MISCELLANEOUS

IC 101	IC		UPC2572GS
IC 201	IC		UPD63702GF
IC 202	IC		TC4S66F
IC 203	IC		NJM062M
IC 301	IC		XLA6997FP
IC 302	IC		BA6285FP
IC 501	IC		PD4501B
IC 601	IC		TA2063F
IC 701	IC		PQ05TZ51
Q 101	Transistor		2SD1664
Q 102	Transistor		UMD2N
Q 201	Transistor		DTA114TU
Q 202	Transistor		UMD2N
Q 601	Transistor		2SD1781K
Q 602	Transistor		2SD1781K
Q 603	Transistor		2SB709A
D 601	Diode		MA151WA
D 701	Diode		1SR154-400
D 702	Diode		1SR154-400
D 801	Chip LED		CL200IRX
D 802	Chip LED		CL200IRX
L 501	Inductor		CTF1305
X 201	Ceramic Resonator	16.93MHz	CSS1363
S 801	Switch (Home)		CSN1028
S 802	Switch (Clamp)		CSN1028
EF 501	EMI Filter		CCG1076
EF 701	EMI Filter		CCG1051

RESISTORS

R 101	RS1/8S100J
R 102	RS1/8S120J
R 103	RS1/16S102J
R 104	RS1/16S822J
R 105	RS1/16S682J
R 106	RS1/16S183J
R 107	RS1/16S822J
R 108	RS1/16S333J
R 109	RS1/16S683J
R 110	RS1/16S134J
R 111	RS1/16S273J
R 112	RS1/16S222J
R 113	RS1/16S103J
R 114	RS1/16S103J
R 115	RS1/16S102J
R 116	RS1/16S163J
R 117	RS1/16S163J
R 118	RS1/16S223J
R 119	RS1/16S223J
R 201	RS1/16S104J
R 202	RS1/16S473J
R 203	RS1/16S102J
R 204	RS1/16S473J
R 205	RS1/16S103J
R 207	RS1/16S103J
R 505	RS1/16S102J
R 507	RA4C102J
R 508	RA4C681J
R 601	RS1/16S102J
R 602	RS1/16S102J
R 603	RS1/16S223J
R 604	RS1/16S223J
R 605	RS1/16S162J
R 606	RS1/16S162J
R 607	RS1/16S103J
R 801	RS1/8S751J
R 802	RS1/8S751J

CAPACITORS

C 101	CEV101M6R3
C 102	CKSQYB104K16
C 103	CEV470M6R3
C 104	CKSYB334K16
C 105	CCSRCH330J50
C 106	CKSRYB103K25
C 107	CEV4R7M35
C 108	CKSQYB273K50
C 109	CCSRCH101J50
C 110	CKSQYB104K16
C 111	CKSRYB332K50
C 112	CKSQYB473K16
C 113	CKSRYB103K25
C 114	CKSRYB391K50
C 115	CCSRCH121J50
C 116	CKSRYB682K25
C 117	CKSRYB333K16
C 118	CKSYB334K16
C 119	CKSYB334K16
C 120	CKSYB334K16
C 121	CKSYB334K16
C 122	CKSQYB104K16
C 123	CKSRYB472K50
C 124	CKSQYB104K16
C 125	CCSRCH6R0D50
C 126	CKSRYB153K25
C 127	CCSRCH102J25
C 128	CKSRYB473K16
C 129	CKSRYB152K50
C 201	CKSYB334K16

=====Circuit Symbol & No.		===Part Name	Part No.
C	202		CKSQYB104K16
C	203		CKSQYB104K16
C	204		CKSQYB104K16
C	205		CKSRYB332K50
C	206		CKSQYB104K16
C	303		CEV470M16
C	304		CKSRYB103K25
C	305		CKSRYB103K25
C	306		CKSRYB103K25
C	307		CEV100M25
C	502		CKSRYB471K50
C	503		CCSRCH100D50
C	601		CEV101M6R3
C	602		CKSQYB104K16
C	603		CEV4R7M35
C	604		CEV4R7M35
C	605		CKSRYB152K50
C	606		CKSRYB152K50
C	607		CEV220M6R3
C	701	22µF/6.3V	CCH1233
C	702		CKSYB334K16
C	703		CEV101M6R3
C	901		CCSRCH471J50
C	902		CCSRCH271J50
C	903		CCSRCH471J50
C	904		CCSRCH101J50

I Unit Number : EWM1031
Unit Name : Deck Unit

MISCELLANEOUS

IC	251	IC	HA12216F
IC	351	IC	PA2020A
Q	271	Transistor	2SC4116
D	352	Diode	1SS355
VR	301	Semi-fixed 33kΩ(B)	CCP1280
VR	302	Semi-fixed 33kΩ(B)	CCP1280

RESISTORS

R	255	RS1/16S181J
R	256	RS1/16S181J
R	257	RS1/16S183J
R	258	RS1/16S183J
R	259	RS1/16S133J
R	260	RS1/16S133J
R	261	RS1/16S274J
R	262	RS1/16S274J
R	271	RS1/16S183J
R	272	RS1/8S0R0J
R	273	RS1/8S0R0J
R	274	RS1/16S0R0J
R	275	RS1/16S473J
R	276	RS1/16S104J
R	277	RS1/16S224J
R	278	RS1/16S104J
R	281	RS1/8S0R0J
R	282	RS1/8S0R0J
R	283	RS1/8S0R0J
R	284	RS1/8S0R0J
R	285	RS1/16S0R0J
R	287	RS1/16S0R0J
R	291	RS1/8S0R0J
R	292	RS1/10S0R0J
R	293	RS1/10S0R0J
R	294	RS1/10S0R0J
R	321	RS1/8S0R0J
R	322	RS1/8S0R0J

=====Circuit Symbol & No.		===Part Name	Part No.
R	351		RS1/16S102J
R	352		RS1/16S102J
R	353		RS1/16S102J
R	354		RS1/16S102J
R	355		RS1/16S274J
R	362		RS1/8S301J
R	373		RS1/16S0R0J
R	374		RS1/8S0R0J
R	375		RS1/8S0R0J
R	401		RS1/16S153J
R	402		RS1/16S332J
R	403		RS1/16S911J
R	404		RS1/16S274J

CAPACITORS

C	251		CKSRYB391K50
C	252		CKSRYB391K50
C	253		CKSRYB391K50
C	254		CKSRYB391K50
C	255		CKSRYB103K50
C	256		CKSRYB103K50
C	271	1µF/50V	ECH0002
C	272		CKSRYB104K16
C	301		CKSRYB104K16
C	302		CKSRYB104K16
C	309		CKSRYB104K16
C	310		CKSRYB104K16
C	351		CKSQYB224K25
C	352		CKSRYB392K50
C	353		CKSRYB103K50
C	354		CKSRYB103K50
C	355		CKSQYB104K50
C	356		CKSRYB103K50
C	401		CKSRYB392K50
C	402		CKSRYB334K10
C	403		CKSRYB223K25
C	404		CKSRYB103K50
C	405		CKSRYB333K16

J Unit Number : EWM1036
Unit Name : Sensor Unit

Q	101	Photo-reflector	EGN1004
S	101	Switch(LOAD)	ESG1007
S	102	Switch(MODE)	ESG1007
S	103	Switch(70µS)	ESG1007

H Unit Number :
Unit Name : Detector PCB

Q	1	Photo Transistor	CPT-230S-X
Q	2	Photo Transistor	CPT-230S-X

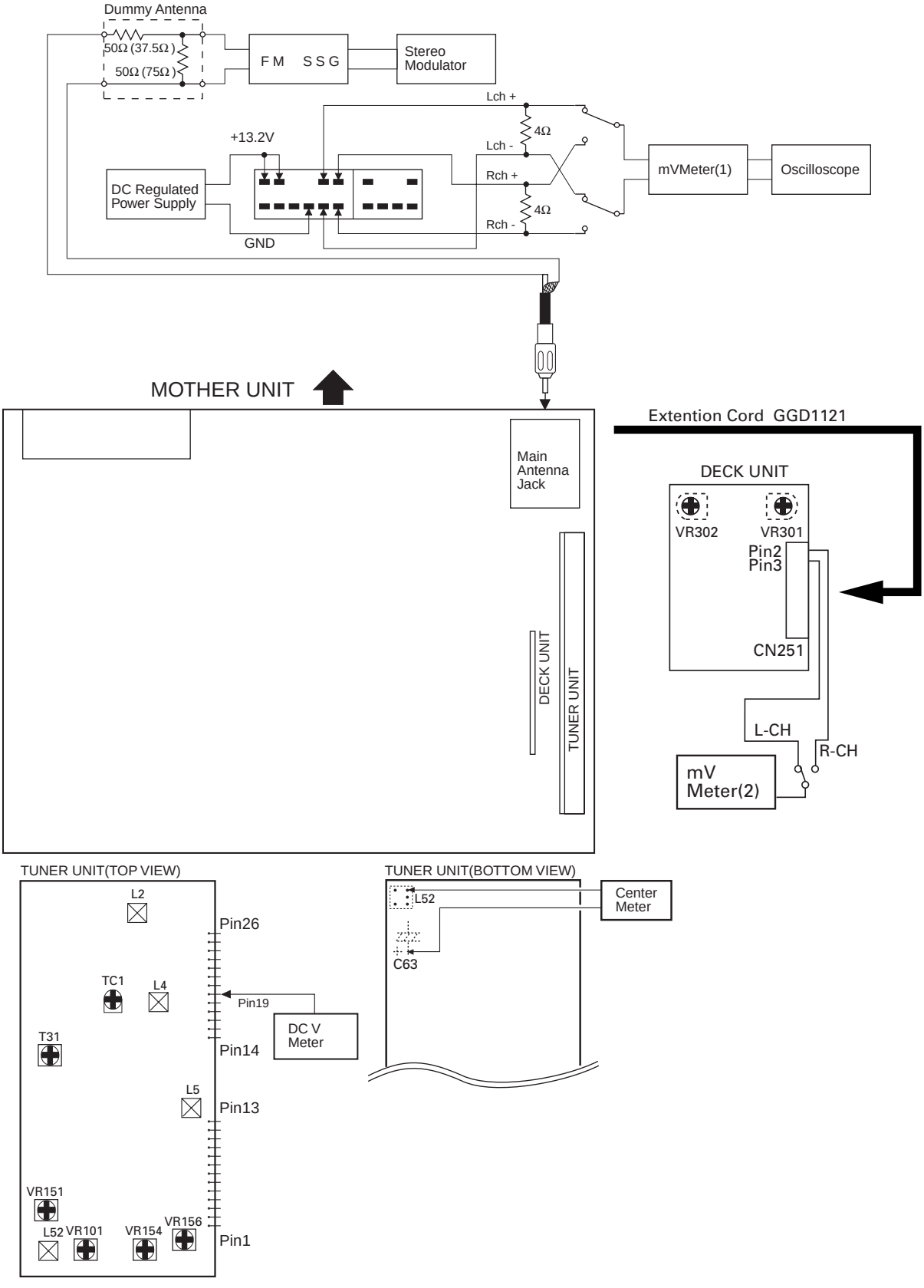
Miscellaneous Parts List

		Pickup Unit(Service)	CXX1232
M	1	Motor Unit(Spindle)	CXA9101
M	2	CRG Motor(Carriage)	CXB3043
M	3	Load Motor Unit(Loading)	CXA8702
M	1	Motor Unit(MAIN)	EXA1491
M	2	Motor Unit(SUB)	EXA1623
HD	1	Head Assy	EXA1594
C	1		CEA4R7M35LS2

6. ADJUSTMENT

6.1 TUNER/AUDIO ADJUSTMENT

●Connection Diagram



FM ADJUSTMENT

NOTE:Before proceeding to further adjustments after switching power ON, let the tuner run for ten minutes to allow the circuits to stabilize.

Modulation M : MONO MOD., 400Hz, 30%(22.5kHz Dev.)
S : STEREO MOD., 1kHz, L or R=30%(20.25+7.5kHz Dev.)

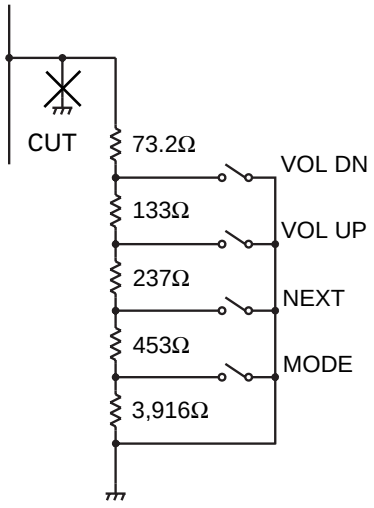
	No.	FM SSG		Displayed	Adjustment	Adjustment Method
		Frequency(MHz)	Level(dBf)	Frequency(MHz)	Point	(Switch position)
OSC	1	90.0	—	90.0	L5	DCV Meter(1) : 6.5V
Detect Coil	1	82.0 M	60	82.0	L52	Center Meter : 0
ANT	1	78.0 M	5	78.0	L2	mV Meter(1) : Maximum
RF Coil	1	78.0 M	5	78.0	L4	mV Meter(1) : Maximum
RF tri		107.9 M	55—75	107.9	TC1	mV Meter(1) : Minimum
IFT	1	82.0 M	5	82.0	T31	mV Meter(1) : Maximum
Separation	1	82.0 S	60	82.0	VR101	mV Meter(1) : Separation Maximum
ARC	1	82.0 S	40	82.0	VR154	mV Meter(1) : Separation 6dB
Interstation Noise		98.1 M	—∞	98.1	VR151	mV Meter(1) : -35dB (STEREO MODE)
Search	1	82.0 M	29	82.0	VR156	DCV Meter : Approx. 4V

DOLBY NR ADJUSTMENT

No.	Test Tape	Adjustment Point	Adjustment Method (Switch position)
1	NCT-150 (400Hz, 200nwb/m)	VR301(Lch), VR302(Rch)	mV Meter(2) : -8.24dBm(300mV)±1dB (Dolby NR Switch : OFF)

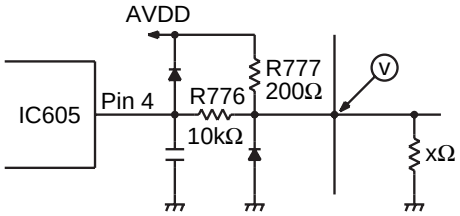
● How to check control without using the steering remote control unit

Schematic diagram of Ford



	Resistance	Voltage	
NULL	Short	0	0.5V
VOL DN	73.2Ω	1.34	1.94V
VOL UP	206.2Ω	2.54	3.00V
NEXT	443.2Ω	3.45	3.77V
MODE	896.2Ω	4.09	4.45V
NULL(for SWL)	4812.2Ω	4.80	4.90V
not SWL	OPEN	5.00(AVDD)	5.00V

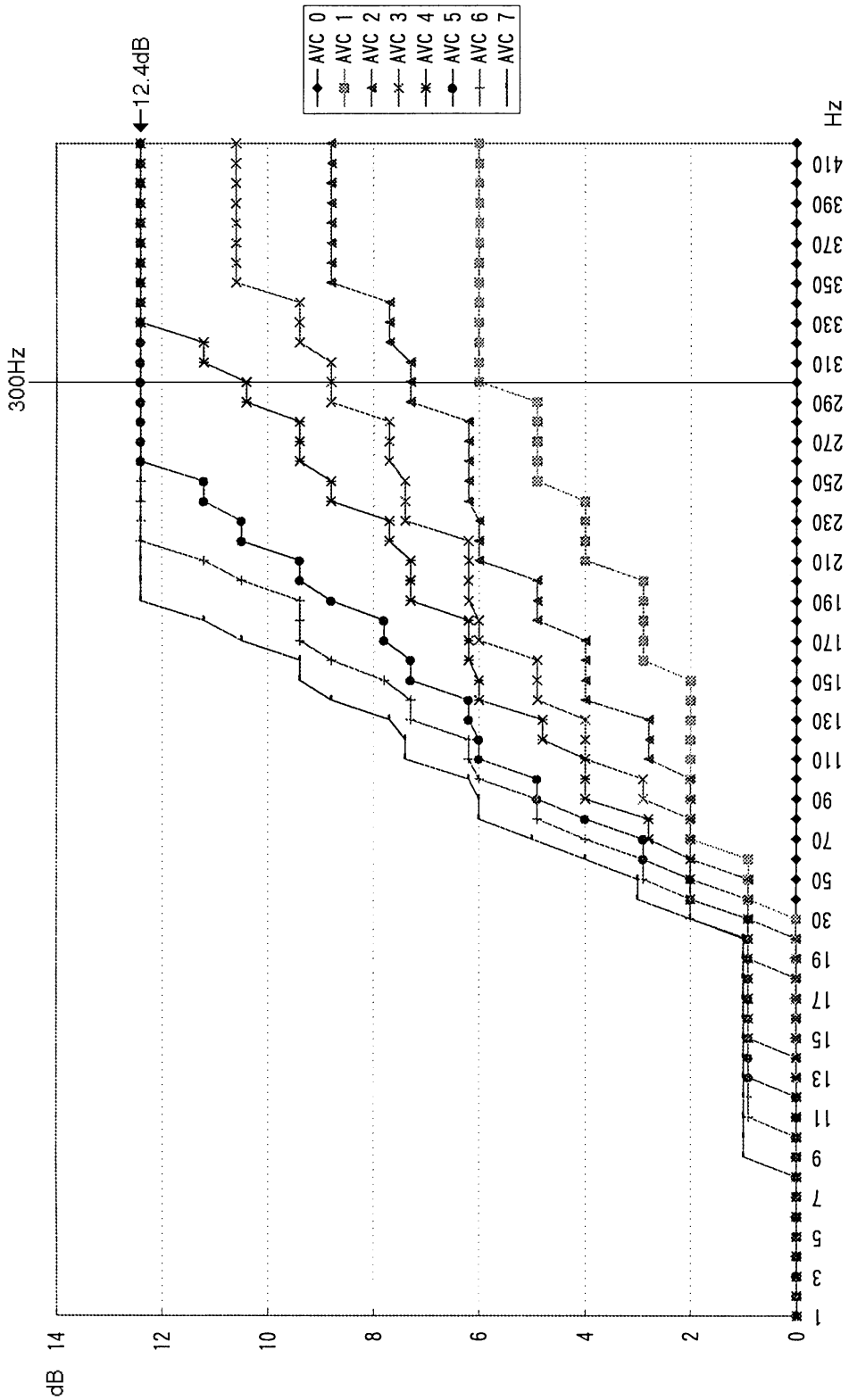
Actual Schematic diagram



	Resistance(x)Ω	Voltage
NULL	Short	0
VOL DN	75Ω	1.36
VOL UP	205Ω	2.53
NEXT	445Ω	3.45
MODE	915Ω	4.10
NULL(for SWL)	4815Ω	4.80
not SWL	OPEN	5.00(AVDD)

Change the resistance value of XΩ as shown in the table to check the voltage value of V.

● Checking the Auto Volume Control



- How to set AVC.
  Press power switch/volume for 3sec. When power on.
  The value of AVC is changed with the select key.
- Set to AVC3 and increase pulses to confirm that the sound level increases. (Set duty to 50%)
- Input vehicle-speed pulse to Pin 9 of J3 mentioned on page 78. Perform measurement.

6.2 TEST MODE

● CD TEST MODE

1)Precautions

· This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFO(approx. 2.5V) instead of GND.
If REFO and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following.
Do not connect the negative probe of the measuring equipment to REFO and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFO with the channel 2 negative probe connected to GND.
Since the frame of the measuring instrument is usually at the same potential as the negative probe, change the frame of the measuring instrument to floating status.
If by accident REFO comes in contact with GND, immediately switch the regulator or power OFF.

· Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.

· Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.

· Since the protective systems in the unit's software are rendered inoperative in test mode, be very careful to avoid mechanical and /or electrical shocks to the system when making adjustment.

· Test mode starting procedure
Switch ACC, back-up ON while pressing the **1** and **3** keys together.

· Test mode cancellation
Switch ACC, back-up OFF.

· Disc detection during loading and eject operations is performed by means of a photo transistor in this unit.Consequently, if the inside of the unit is exposed to a strong light source when the outer casing is removed for repairs or adjustment, the following malfunctions may occur.
* During PLAY, even if the eject button is pressed,the disc will not be ejected and the unit will remain in the PLAY mode.
* The unit will not load a disc.
When the unit malfunctions this way, either re-position the light source, move the unit or cover the photo transistor.

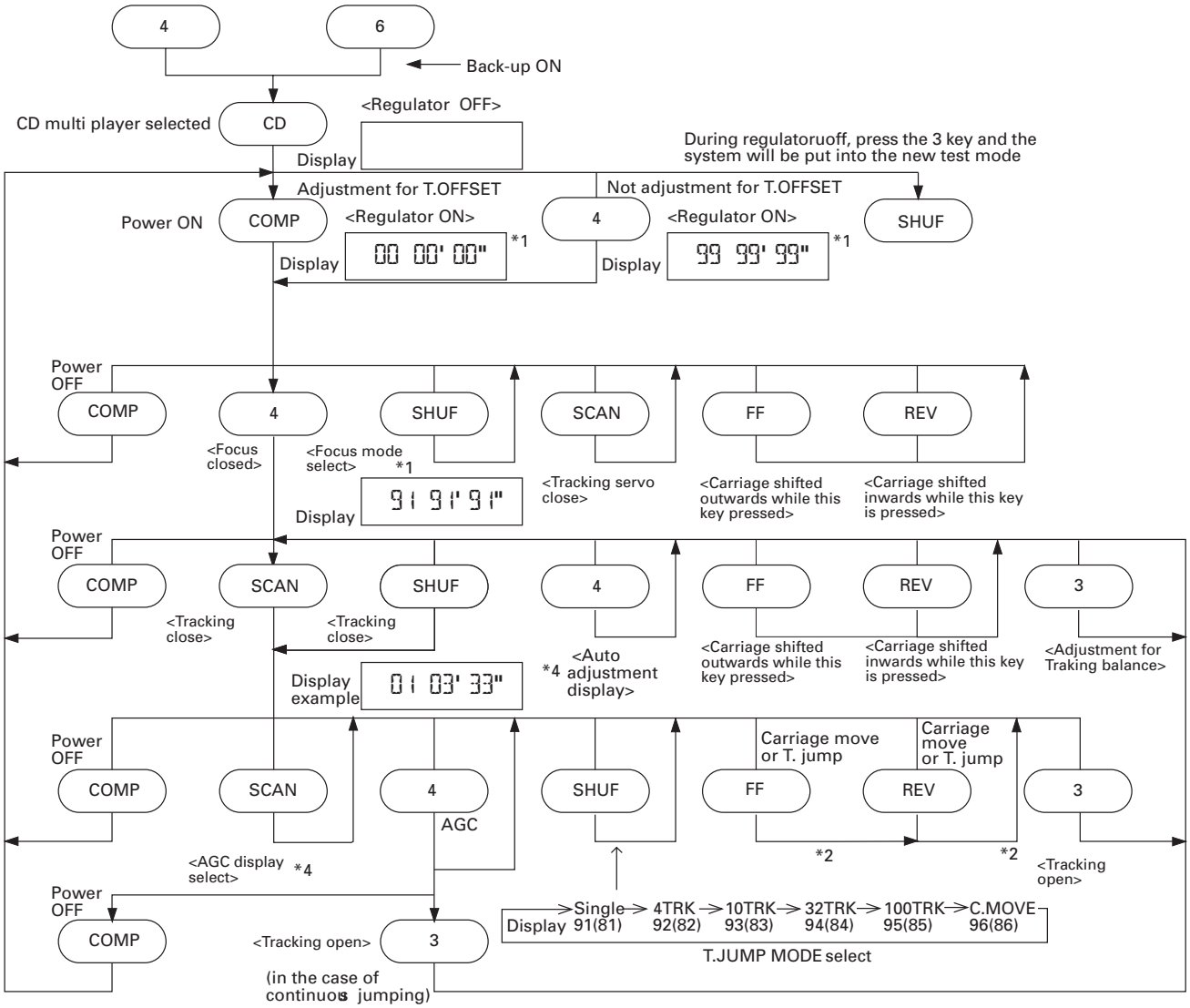
· When loading and unloading discs during adjustment procedures, always wait for the disc to be properly clamped or ejected before pressing another key. Otherwise, there is a risk of the actuator being destroyed.

· Turn power off when pressing the button **TRACK UP** or the button **TRACK DOWN** key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)

· SINGLE/4TRK/10TRK/32TRK will continue to operate even after the key is released.Tracking is closed the moment C-MOVE is released.

· JUMP MODE resets to SINGLE as soon as power is switched OFF.

● Flow Chart



*1 Normal focus close → S curve check → Focus EQ check
Display 00(99) 01 02

*2 Single TR/4TR/10TR/32TR/100TR

*3 CRG Move 100TR JUMPOnly

*4 MIN,SEC(or Thack No.) → F.AGC Gain → T.AGC Gain → F.Bias

*5 Normal display → Focus cancel → Tracking offset → Tracking balance → Rough Servo

6.3 CHECKING THE GRATING

● **Checking the Grating After Changing the Pickup Unit(Service)**

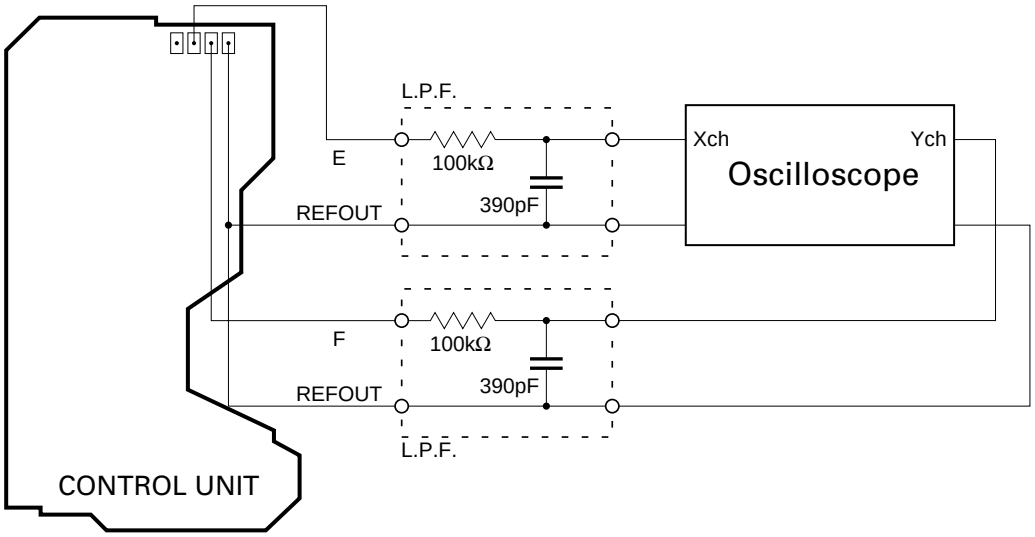
· **Note :**
Unlike previous CD mechanism modules the grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

· **Purpose :**
To check that the grating is within an acceptable range.

· **Symptoms of Mal-adjustment :**
If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or track searching taking a long time, may appear.

· **Method :**

· Measuring Equipment	· Oscilloscope, Two L.P.F.
· Measuring Points	· E, F, REFOUT
· Disc	· ABEX TCD-784
· Mode	· TEST MODE



· **Checking Procedure**

1. In test mode, load the disc and switch the 5V regulator on.
2. Using the **FF** and **REV** buttons, move the PU unit to the innermost track.
3. Press key **4** to close focus, the display should read "91". Press key **3** to implement the tracking balance adjustment the display should now read "81". Press key **4** 4 times. The display will change, returning to "81" on the fourth press.
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75° . Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75° try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75° then the mechanism should be judged to be at fault.

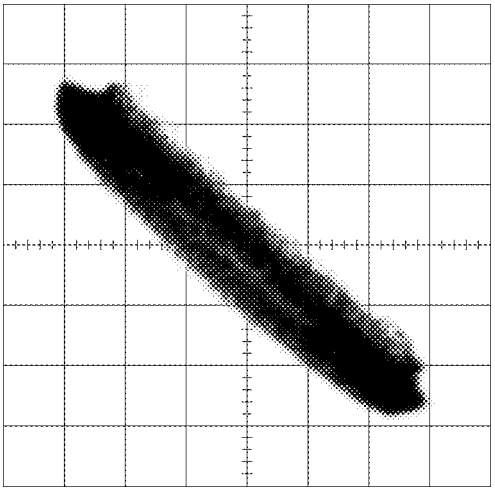
· **Note**
Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

· **Hint**
Reloading the disc changes the clamp position and may decrease the "wobble".

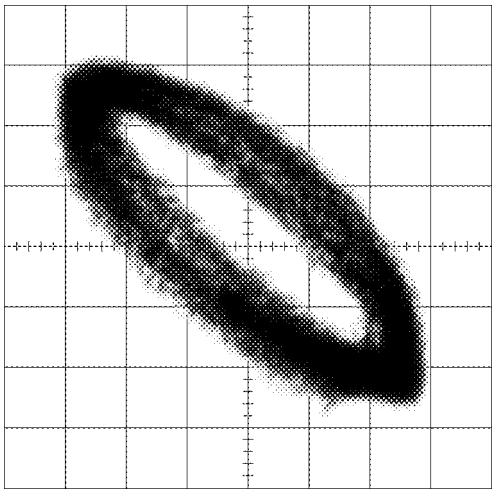
Grating waveform

Ech → Xch 20mV/div, AC
Fch → Ych 20mV/div, AC

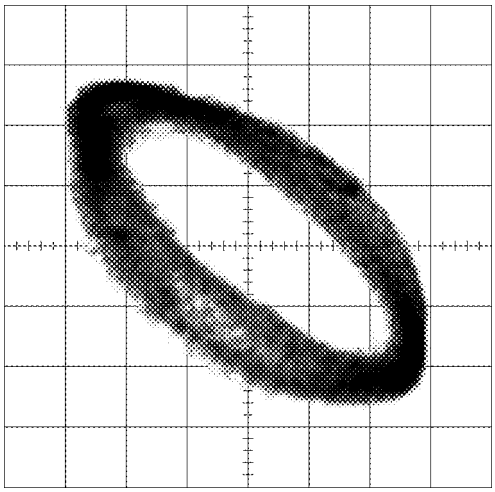
0°



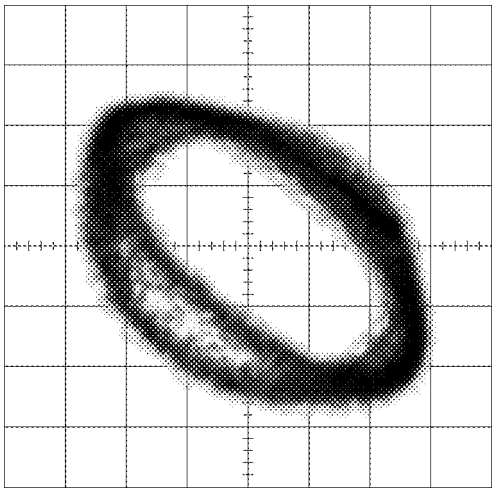
30°



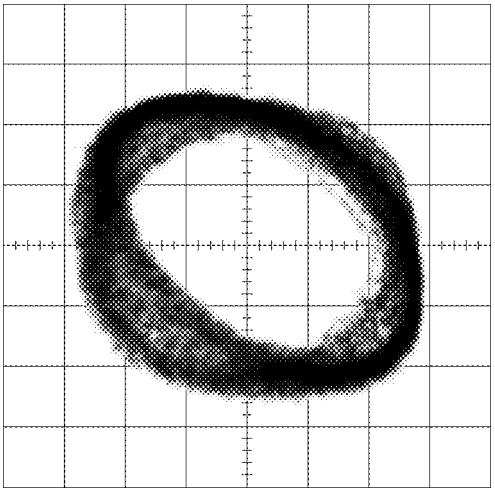
45°



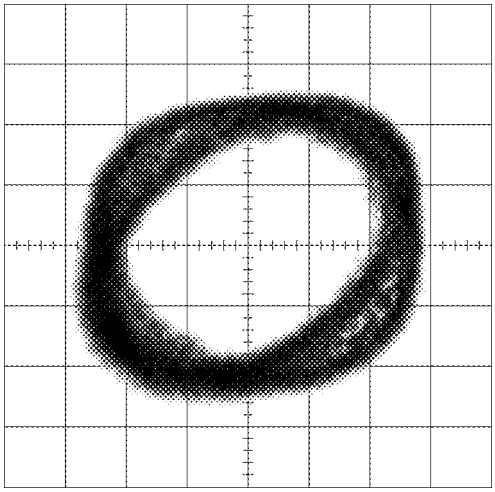
60°



75°



90°



6.4 NEW TEST MODE

● Error Number Indication

If the CD should fail to operate or if an error has taken place during operation the player will enter into the error mode, and the cause of the error will be numerically indicated.

This is aimed at assisting in analysis or repair.

(1) Basic Means of Display

・With ERROR indicated in "MODE" on IP-BUS Display data, an error code is transmitted by the use of MIN and SEC. The MIN and SEC data will be identical.

・Examples of Display Er XX

(2) Error Codes

Error Code	Classification	Description	Cause/Detail
10	ELECTRIC	Carriage home failure	Carriage doesn't move to or from the innermost position →Home switch failed and/or carriage immobile
11	ELECTRIC	Focus failure	Focus failed →Defects, disc upside-down, severe vibration
12	ELECTRIC	SETUP failure Subcode failure	Spindle failed to lock or subcode unreadable →Spindle defective, defect, severe vibration
14	ELECTRIC	Mirror failure	Unrecorded CD-ROM The disc is upside-down, defects, vibration
17	ELECTRIC	Set up failure	AGC protect failed →Defects, disc upside-down, severe vibration
30	ELECTRIC	Search time out	Failed to reach target address →Carriage/tracking defective and/or defects
A0	SYSTEM	Power failure	Power overvoltage or short circuit detected →Switching transistor defective and/or power abnormal

"defects" means scratches, dirt etc an the surface of the disc.

● Single CD Player New Test Mode(aging operation and setup analysis)

The single CD player plays in normal mode. After being set up, it will display FOK (focus), LOCK (spindle), subcode, sound skip, protection against a mechanical error or the like, occurrence of an error, cause and time of an expiry, if any, (and disk number)

During the setup, the CD software operation status (internal RAM and C-point)is displayed.

(1) How to enter NEW TEST Mode

See the test mode flow chart Page 70.

(2) Relations of keys between TEST and NEW TEST Modes

Keys	Test Mode		New Test Mode	
	Regulator OFF	Regulator ON	PLAY in progress	Error Occurred, Protection Activated
5	Regulator ON	Regulator OFF	—	Time of occurrence / cause of error select
TRACK UP	—	FWD-Kick	TRACK UP / FF	—
TRACK DOWN	—	REV-Kick	TRACK DOWN /REV	—
3	—	Tracking close	SCAN	—
4	—	Tracking open	MODE	—
1	—	Focus close	—	—
SCAN	To New Test Mode	Focus Mode Select	AUTO/MANU	—

Operations,such as EJECT, CD ON/OFF, etc. are performed normally

(3) Error Cause (Error Number) Code

Error Code	Classification	Mode	Description	Cause	Detail
40	ELECTRIC	PLAY	FOK=L	Put out of focus	Scratch, Stain, Vibration, Servo defect, etc...
41	ELECTRIC	PLAY	LOCK=L 150ms	Spindle unlock	
42	ELECTRIC	PLAY	Subcode unacceptable 500ms	Failed to read subcode	
43	ELECTRIC	PLAY	Sound skipped	Last address memory operated	

(4) Indicating an Operation Status During Setup

Status No.	Description	Protection operation
01	Carriage home mode started	None
02	Carriage moving inwards	10-second time out, Home switch failed
03	Carriage moving outwards	10-second time out, Home switch failed
05	Carriage moving outwards	None
11	Setup started	None
12	Spindle turn/Focus search started	None
13	Waiting for focus closure (XSI=L)	Failure to close focus
10,14	Waiting for focus closure (FOK=H)	Failure to close focus
15, 16, 17	Focus closed, Tracking open	Focus disrupted
18	During focus AGC Subcode waiting	Focus disrupted
19	During tracking AGC	Disrupted focus
20	Waiting for MIRR, LOCK or subcode read Carriage closed, SPINDLE=ADAPTIVE	Focus disrupted, MIRR NG, Failure to lock, failed to read subcode

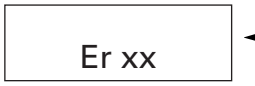
5) Example of Display.

· SET UP in progress

· Operation (PLAY, SEARCH, etc.) in progress perfectly identical with that in the normal mode.

· Protection/Error upon occurrence

(a) Error number indicated



Select the display with the 5 key.

(b) Track number and absolute time indicated

6.5 FUNCTION

DIAGNOSTICS (This function is only work in TUNER mode)

D	No.	FUNCTION	KEY TRIGGER	NOTE
	1	DIAGNOSTICS RUN B & A(BODY & ASSEMBLY) TEST	Start DIAGNOSTICS mode by pressing 1-24, 1-27 at the same time more than 1 Sec. to less than 5 Sec. -CONTENTS OF DIAGNOSTICS- RADIO SELF-TEST SPEAKER WALK-AROUND TEST HIDDEN ANTENNA TEST SUBWOOFER TEST CDDJ COMMUNICATION TEST	VALID IN TUNER MODE *1 *1 *1 *1 *1
	2	AUDIO SUBSYSTEM SELF-TEST	Start AUDIO SUBSYSTEM SELF-TEST by 1-22 during B & A TEST or other DIAGNOSTICS In case that error is found ,error is stored as DTC (DIAGNOSTICS TROUBLE CODES)	*2 ↑ ↑
	3	VIEW AUDIO SUBSYSTEM SELF-TEST RESULT	In case that error is stored as DTC , after finish SELF-TEST. SCROLL stored DTC by 1-6 , 1-7	↑
	4	VIEW DTC'S	During B & A test or other DIAGNOSTICS TEST, display DTC by 1-23. Then SCROLL DTC by 1-6 , 1-7	↑
	5	CLEAR DTC'S	While display DTC, CLEAR DTC by 1-15 or 1-18 more than 1 Sec.	↑
	6	RUN SIGNAL STRENGTH TEST	During B & A test or other DIAGNOSTICS TEST, display the SIGNAL STRENGTH of the currently tuned frequency by 1-24	↑
	7	VIEW SOFTWARE CONFIGURATION LEVEL	During B & A test or other DIAGNOSTICS TEST, display SOFTWARE CONFIGURATION LEVEL(VERSION) by 1-25	↑
	8	RUN DISPLAY TEST	During B & A test or other DIAGNOSTICS TEST, radio illuminates all elements of VFD for 5 Sec. by 1-26	↑

*1 RADIO SELF-TEST : Confirm whether the CHECK SUM of inner memory of m-COM (and so on) is normal or not.
SPEAKER WALK-AROUND TEST: Output TUNER SOUND from each speaker in turn for 5 Sec.(in order to check the CAR WIRING)
HIDDEN ANTENNA TEST : Start TUNER SEEK. If RADIO found the station, output from speakers for 2 Sec.
SUBWOOFER TEST : Output TUNER SOUND from subwoofer for 1.5 Sec.
CDDJ COMMUNICATION TEST : Display whether CDDJ is connected or not.

*2 AUDIO SUBSYSTEM SELF-TEST : Confirm the RESULT of RADIO SELF-TEST included *1 and whether the equipment which communicate on ACP network are connected with RADIO or not.

7. GENERAL INFORMATION

7.1 DIAGNOSIS

7.1.1 DISASSEMBLY

● **Removing the Case(Not shown)**

1. Insert and turn a flat screwdriver to remove the case.

● **Removing the Grille Unit(Not shown)**

1. Removing the two screws.
2. Press the four tabs and Disconnect the connector indicated by arrow and then removing the Grille Assy.

● **Removing the Heat Sink(Fig. 1)**

1. Removing the five screws and then removing the Heat Sink.

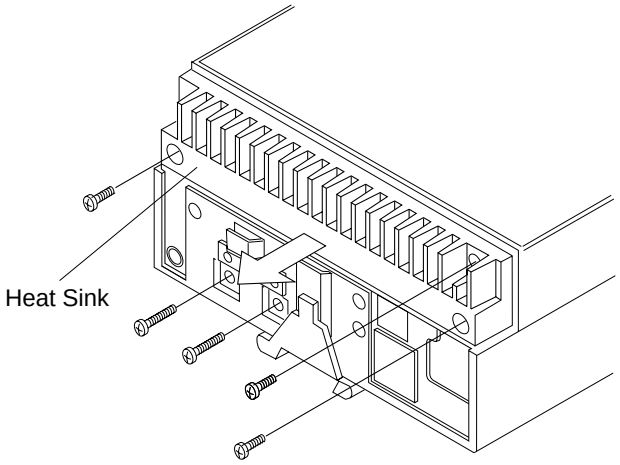


Fig. 1

● **Removing the CD Mechanism Module and Chassis Unit(Fig. 2)**

1. Removing the four screws A.
2. Disconnect the connector and then removing the CD Mechanism Module.
3. Removing the six screws B and then removing the Chassis Unit.

CAUTION: Plug the Connector into the card connector of the CD mechanism or main unit at an angle of 60 degrees.

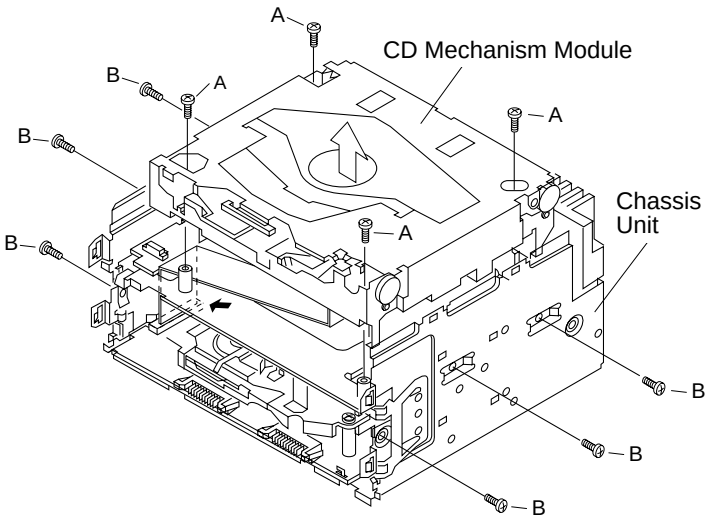


Fig. 2

● **Removing the Cassette Mechanism Module(Fig.3)**

1. Removing the four screws.
2. Disconnect the connector and then removing the Cassette Mechanism Module.

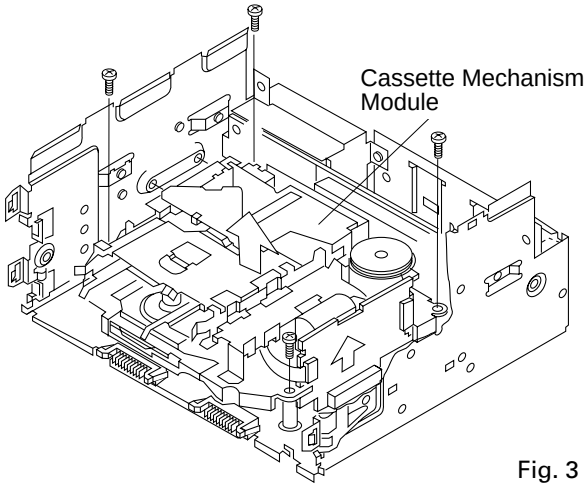


Fig. 3

● **Removing the Mother Unit(Fig.4)**

1. Removing the five screws.
2. Unbend the tabs at four locations and then removing the Mother Unit.

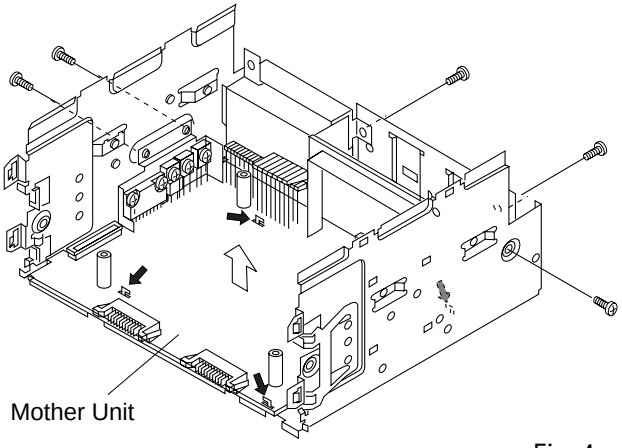
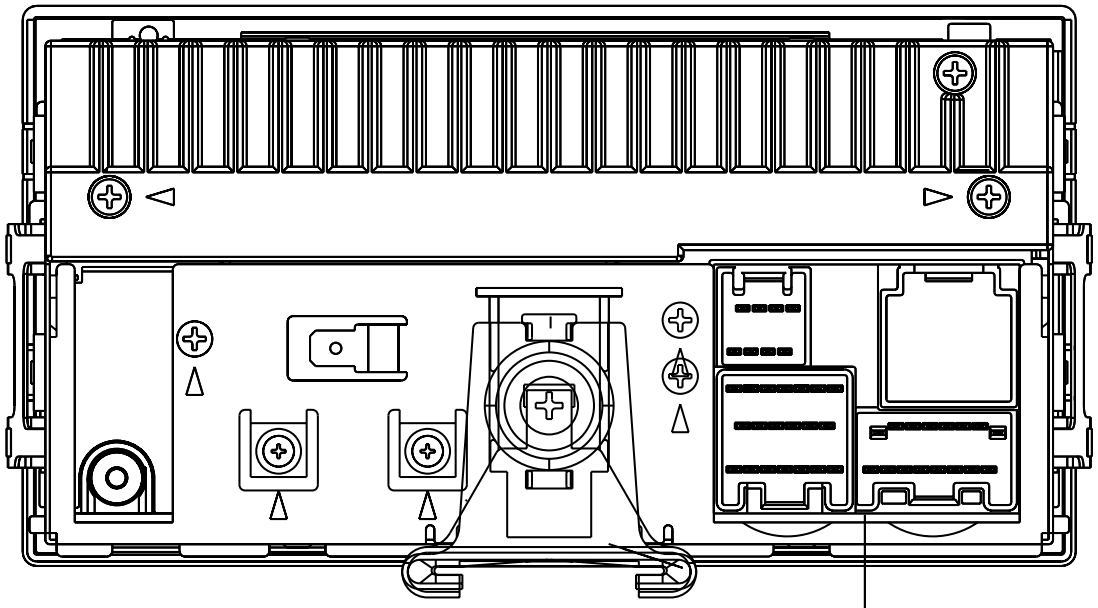
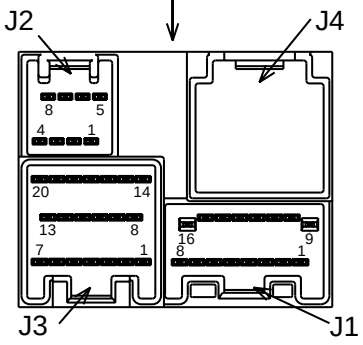


Fig. 4

7.1.2 CONNECTOR FUNCTION DESCRIPTION



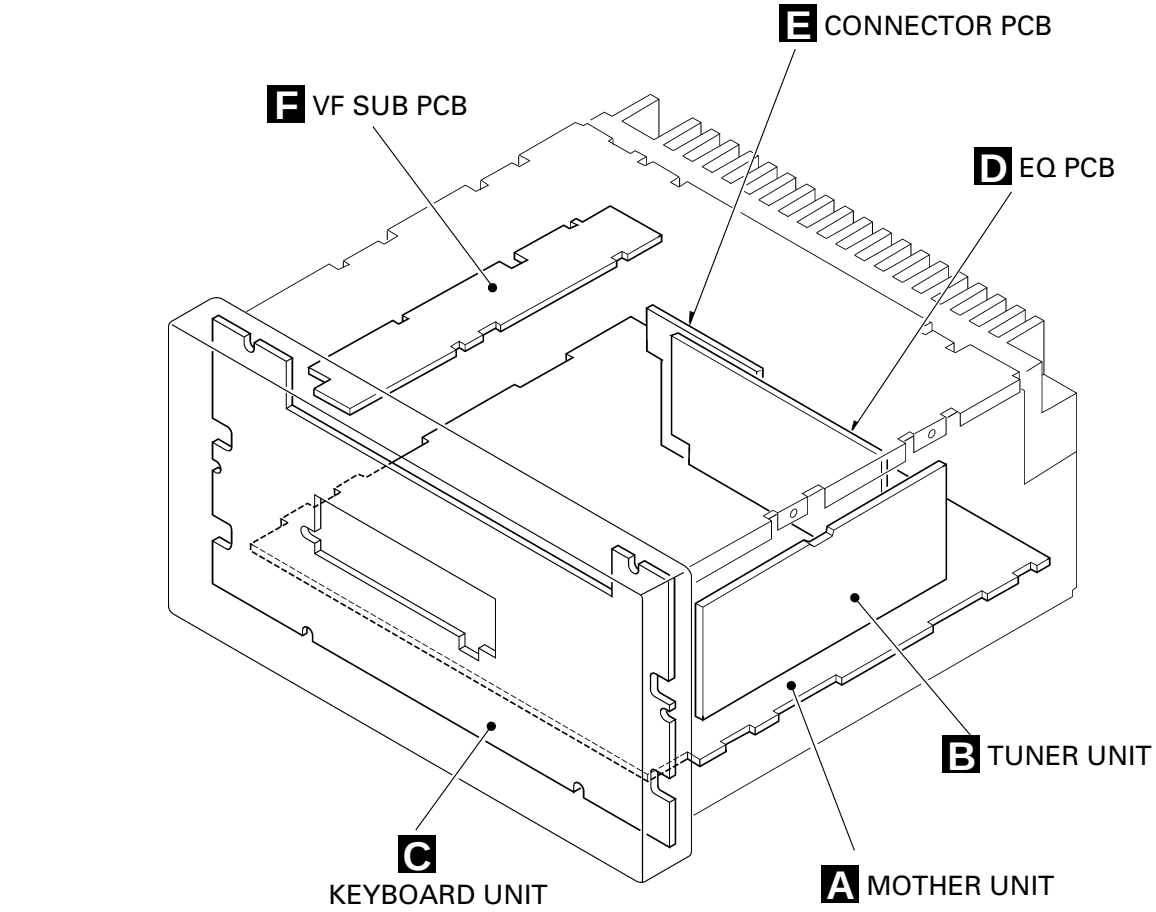


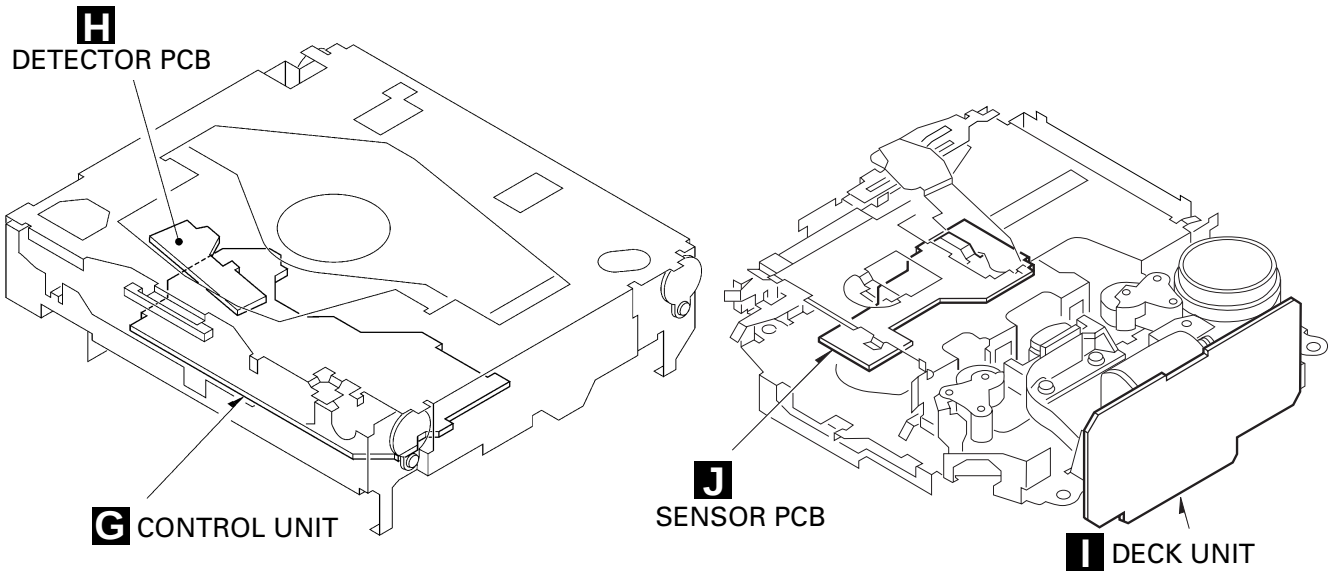
J1	
PIN#	FUNCTION
1	ILLUM(+)
2	ILLUM(-)
3	START
4	CLOCK
5	RR(+)
6	RR(-)
7	RF(+)
8	RF(-)
9	V.BATTERY(+)
10	RUN/ACCY.
11	RADIO GND
12	LR(+)
13	LR(-)
14	LF(+)
15	LF(-)
16	PW AMP GND

J2	
PIN#	FUNCTION
1	SW AUDIO(-)
2	SW AUDIO(+)
3	SW AUDIO SHLD
4	SW E/CLD
5	N.C.
6	N.C.
7	N.C.
8	N.C.

J3	
PIN#	FUNCTION
1	N.C.
2	PW ANTENNA
3	SCP(+)
4	SCP(-)
5	ASYSON
6	ACP A
7	ACP B
8	N.C.
9	SPEED INPUT
10	PTA(PHONE)
11	MONO(-)
12	MONO(+)
13	MONO SHLD
14	SWC1
15	N.C.
16	CDDJ SHLD
17	CDDJR(+)
18	CDDJR(-)
19	CDDJL(+)
20	CDDJL(-)

7.1.3 PCB LOCATION

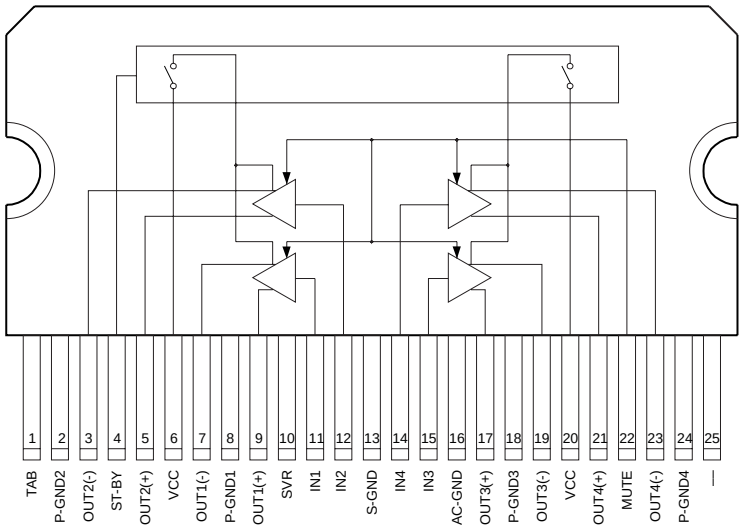




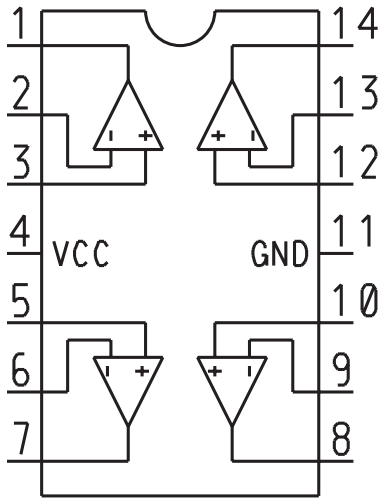
7.2 PARTS

7.2.1 IC

TDA7560



BA14741F

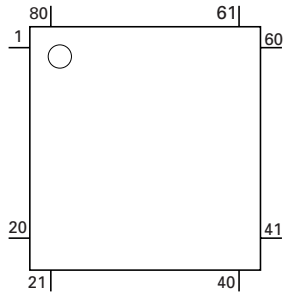


● **Pin Functions(PE5188A)**

Pin No.	Pin Name	I/O	Format	Function and Operation
1	RMUTE	I		Rear mute
2	MUTE	O	C	Mute
3	NC	O	C	Not used
4	AVSS			GND
5,6	NC	O	C	Not used
7	AVREF1			VDD
8	ARXD	I		ACP-BUS receive pin
9	ATXD	O		ACP-BUS trans pin
10	NC	O	C	Not used
11	RDSSTI	I		RDS microcomputer serial data input pin
12	RDSSTO	O		RDS microcomputer serial data output pin
13	$\overline{\text{RDSCK}}$			RDS microcomputer serial clock pin
14	EDTI	I		NVRAM data input pin
15	$\overline{\text{BRXEN}}$	I/O		RX enabled pin
16	$\overline{\text{BSRQ}}$	I		Request output pin
17	BDATA	I/O		P-BUS serial data input/output pin
18	$\overline{\text{BSCK}}$			P-BUS serial clock pin
19	$\overline{\text{BRST}}$	O	C	P-BUS reset pin
20	SYSPW	O	C	System power
21	EVCK	O	C	NVRAM. EVOL clock output
22	EVDT1	O	C	NVRAM. EVOL1 data output
23	DJPSEL0	O	C	$\overline{\text{CD/DJ}}$ PHONE audio select 0 (Front)
24	NC	O	C	Not used
25	ECE	O	C	NVRAM Chip enable
26	MUTE	O	C	System mute
27-29	NC	I/O	C	Not used
30	PSW	I/O	C	Power sense
31	CLOCK	I/O	C	CLOCK
32	NC	I/O	C	Not used
33	VSS			GND
34,35	NC	I/O	C	Not used
36	$\overline{\text{KST0}}$	O	N	Key strobe 0
37	$\overline{\text{KST1}}$	O	N	Key strobe 1
38	$\overline{\text{KST2}}$	O	N	Key strobe 2
39	$\overline{\text{KST3}}$	O	N	Key strobe 3

Pin No.	Pin Name	I/O	Format	Function and Operation
40	RDSSEL	O	C	RDS mother select pin
41	$\overline{\text{RDSRST}}$	O	C	RDS mother reset pin
42	$\overline{\text{RDSEN}}$	O	C	RDS mother enable pin
43	SUBMUTE	I		Sub mute
44	PCE	O	C	PLL (LC72146) IC chip enable
45	PCK	O	C	PLL (LC72146) IC clock output
46	PDO	I		PLL (LC72146) IC data output
47	PDI	O	C	PLL (LC72146) IC data input
48	VST	O	C	EVOL strobe pin
49	VDT2/PCL	O	C	EVOL2 data output/PCL output
50	SD	I		SD input
51	TEST/TEN	I		Test mode/Test mode enable
52-58	$\overline{\text{KD0}}$-$\overline{\text{KD6}}$	I		Key return 0-6
59	S/$\overline{\text{M}}$	I		S/$\overline{\text{M}}$
60	$\overline{\text{RESET}}$	I		Reset
61	SPEED	I		Speed pulse input
62	$\overline{\text{PTA}}$	I		PHONE WAKE-UP input
63	$\overline{\text{BSENS}}$	I		BACK UP sense
64	$\overline{\text{ASENS}}$	I		ACC sense
65	NC	I		Not used
66	$\overline{\text{ACPINT}}$	I		ACP-BUS interrupt edge input
67	ROTINT	I		Rotary encoder interrupt edge input
68	VDD			Microcomputer power supply
69	X2			Oscillator output (4.9152MHz)
70	X1			Oscillator input (4.9152MHz)
71	IC			Connect to GND
72	XT2			Sub clock oscillator output (32.768KHz)
73	XT1			Sub clock oscillator input (32.768KHz)
74	AVDD	I		A/D converter analog power supply
75	AVREF0	I		A/D converter reference voltage input
76	SL	I		SL level input
77	ASYSON	O	C	Last source ON/OFF output
78	RSPSW	O	C	Rear speaker $\overline{\text{VOL1}}$,VOL2 output select SW
79	ROTIN0	I		Rotary encoder pulse input 0
80	ROTIN1	I		Rotary encoder pulse input 1

PE5188A



Format	Meaning
C	C MOS
N	N channel open drain

*IC's marked by * are MOS type.*
Be careful in handling them because they are very liable to be damaged by electrostatic induction.

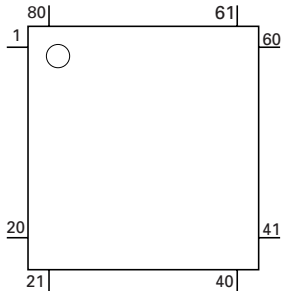
● Pin Functions(PE5315A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	NC	O	C	Not used
2	VFCE	O	C	VF driver chip enable
3	$\overline{\text{VFBLK}}$	O	C	VF driver inhibit port
4	AVSS			Connect to GND
5	ILMOUT	O		Illumination D/A output
6	NC	O	C	Not used
7	AVREF1	I		Connect to VDD
8	ILM2	I		Illumination input sense
9	VFDT	O	C	VF driver data output
10	VFCK	O	C	VF driver clock input/output

Pin No.	Pin Name	I/O	Format	Function and Operation
11	XSI	I	C	CD LSI serial data input
12	XSO	O	C	CD LSI serial data output
13	$\overline{\text{XSCK}}$	O	C	CD LSI serial clock output
14	NC	O	C	Not used
15	$\overline{\text{BRXEN}}$	I/O	C	P-BUS receive input/output
16	$\overline{\text{BSRQ}}$	I		P-BUS communication request input (TSI)
17	BSIO	I/O	C	P-BUS communication serial data input/output (TSO)
18	$\overline{\text{BSCK}}$	I/O	C	P-BUS communication serial clock input/output (TSCK)
19	$\overline{\text{XRST}}$	O	C	CD LSI reset output
20	XAO	O	C	Control signal data from microcomputer
21	$\overline{\text{XSTB}}$	O	C	CD LSI strobe output
22	VDCNT	O	C	VD (CD module power supply) control
23	CD5VON	O	C	CD 5V power supply control
24	CONT	O	C	Servo driver power control
25	CDLOAD	O	C	Load motor load control output
26	CDEJECT	O	C	Load motor eject control output
27	$\overline{\text{CDMUTE}}$	O	C	CD mute output
28	$\overline{\text{HOME}}$	I	C	Home position detector input
29	$\overline{\text{CLAMP}}$	I	C	Disc clamp sense input
30	FOK	I	C	FOK signal input
31	MIRR	I	C	Mirror detector input
32	LOCK	I	C	Spindle lock detector input
33	VSS			Connect to GND
34	CSEL	O	C	CD compression output
35	PHONE	I	C	Phone button illumination output
36	ADCLK	O	N	External A/D convertor serial clock
37	ADDO	O	N	External A/D convertor serial data output
38	ADDI	I	N	External A/D convertor serial data input
39	ADCS	O	N	External A/D convertor chip selector
40	$\overline{\text{XST}}$	O	C	Extended I/O strobe output
41	XDT	O	C	Extended I/O data output
42	XCK	O	C	Extended I/O clock output
43	TAPPW	O	C	Tape power supply control
44	F/R	O	C	Normal/Reverse output
45	PEE1	O	C	Beep tone output for diagnosis (walking speaker)
46	PLAY	O	C	MS filter output
47	NR	O	C	Noise reduction output
48	SC2	O	C	Sub motor control 2 output
49	SC1	O	C	Sub motor control 1 output
50	CM	O	C	Capstan motor control
51	$\overline{\text{STBY}}$	O	C	Mecha standby control
52	MSIN	I	C	Curved pulse input
53	$\overline{\text{MTL}}$	I	C	Cassette mechanism METAL detector input
54	CSLOAD	I	C	Cassette mechanism Loading detector input
55	POS	I	C	Cassette mechanism position sense input
56	RES	I	C	Cassette mechanism reverse end sense input
57	NES	I	C	Cassette mechanism normal end sense input
58	DMUTE	O	C	Cassette mute pin
59	PEE2	O	C	Beep tone output for diagnosis (sub woofer)
60	$\overline{\text{RESET}}$	I		Reset
61	NC	O	C	Connect to GND
62	$\overline{\text{BSENS}}$	I	C	B. up Sense
63	$\overline{\text{BRST}}$	I	C	P-BUS reset input
64	NC	O	C	Not used
65	$\overline{\text{CDEJ}}$	I	C	CD EJECT switch input
66	$\overline{\text{CSEJ}}$	I	C	Cassette EJECT switch input
67	NC	O	C	Not used
68	VDD			Microcomputer power supply
69	X2			Oscillator output
70	X1			Oscillator input

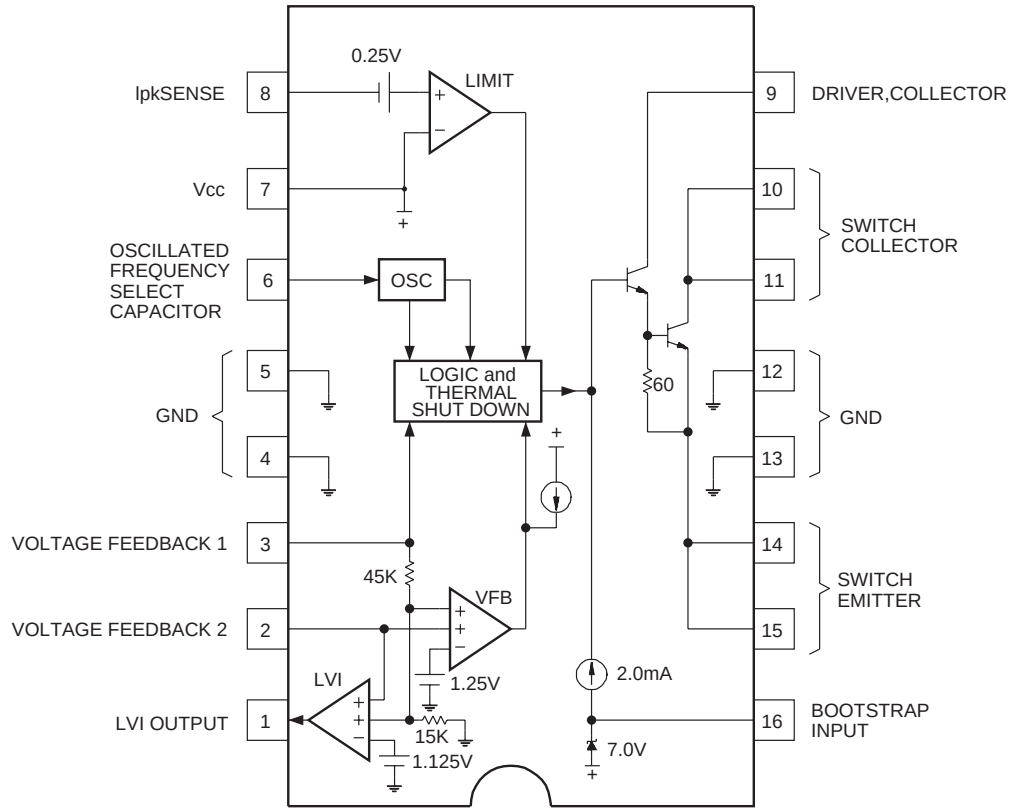
Pin No.	Pin Name	I/O	Format	Function and Operation
71	IC			Connect to GND
72	XT2			OPEN
73	TEST	I		Test mode/test mode enable
74	AVDD			A/D converter analog power supply
75	AVREF0	I		A/D converter reference voltage input
76	DSCSNS	I		Disc detect input
77	EJTSNS	I		Disc EJECT sense input
78	TEMP	I		Temperature detector
79	VDSENS	I		VD overvoltage, ground-fault sensing input
80	ADPW	O	C	Analog power supply control

PE5315A



Format	Meaning
C	C MOS
N	N channel open drain

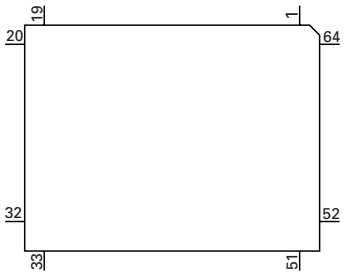
SC33165ADWR2



● **Pin Functions (PD6181B)**

Pin No.	Pin Name	I/O	Format	Function and Operation
1	PCK	O	N	PLL communications clock output
2	PDO	O	N	PLL communications data output
3	PDI	I		PLL communications data input
4	SL	I		Signal level input
5	NL	I		Noise level input
6	TRGL			Connect to pulldown
7	SOUND			Audio signal input for identification of identical program
8	RMUTE	O	N	RDS mute output
9-11	OPEN	O	N	L output
12	AVCC			5V power supply input
13	AVR			5V power supply input
14	AVSS			Connect to GND
15	IRSEL			µ COM select input
16	RCK	I		RDS recovery modulation clock input
17	RDT	I		RDS recovery modulation data input
18	LDET			PLL lock detection input
19	RDSLK	I		RDSLK signal input
20	IRRST	I		µ COM reset input
21	MOD0			Connect to GND
22	MOD1			Connect to GND
23	Xin	I		Oscillator input
24	Xout	O	C	Oscillator output
25	VSS			Connect to GND
26	DRST	O	C	Decoder reset output
27	L/S	O	C	Noise level sensitivity select output
28	CURRQ	O	C	PLL-TV-Fix output
29	IRRDY	O	C	Communications ready output
30	RECIVE	O	C	OPEN
31	CORR	O	C	OPEN
32	ERROR	O	C	OPEN
33	NC	O	C	OPEN
34-38	NC	I		OPEN
39	DK	I		OPEN
40	SK	I		OPEN
41	MUTCNT	I		OPEN
42-49	NC	I		OPEN
50	VSS			Connect to GND
51	TEST	I		Test program input
52	IRCK			Communications clock input
53	IRDO		C	Communications data output
54	IRDI			Communications data input
55	PCE	O	C	PLL communication enable output
56	GD	O	C	Tuner unit gate drive control output
57	VCC			5V power supply input
58	SD	I		SD signal input
59	MDSENS	I		Modulation detector input
60-64	NC	O	N	OPEN

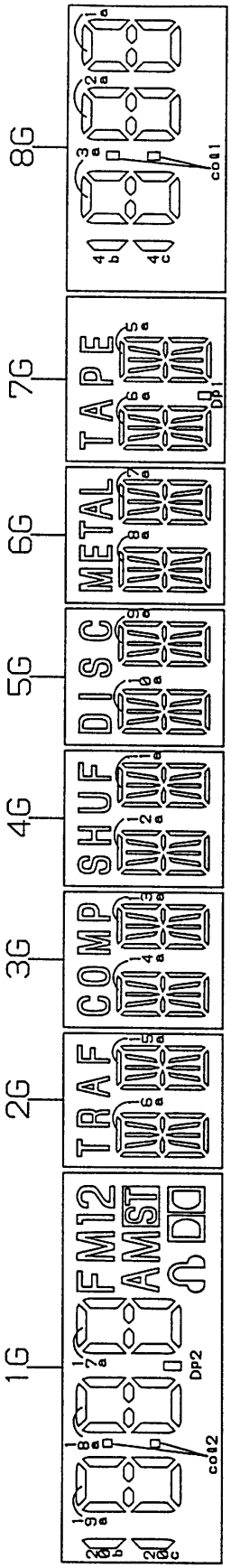
*PD6181B



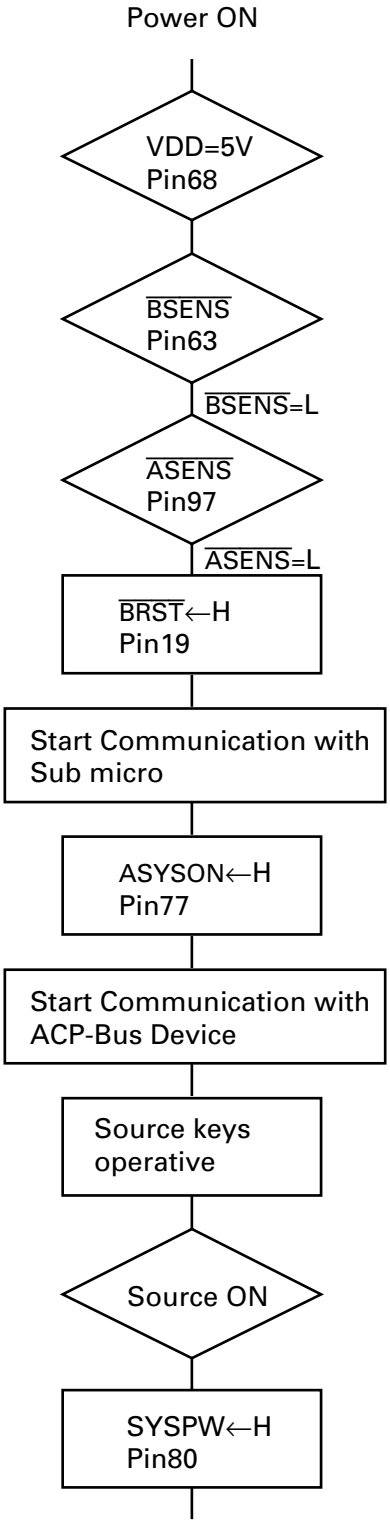
Format	Meaning
C	C MOS
N	N channel open drain

7.2.2 DISPLAY

● **VF(HAW1359)**



7.3 OPERATIONAL FLOW CHART



Completes power-on operation.
(Then proceed toeach source operation)

7.4 CLEANING

Before shipping out the product, be sure to clean the following portions by using the prescribed cleaning tools:

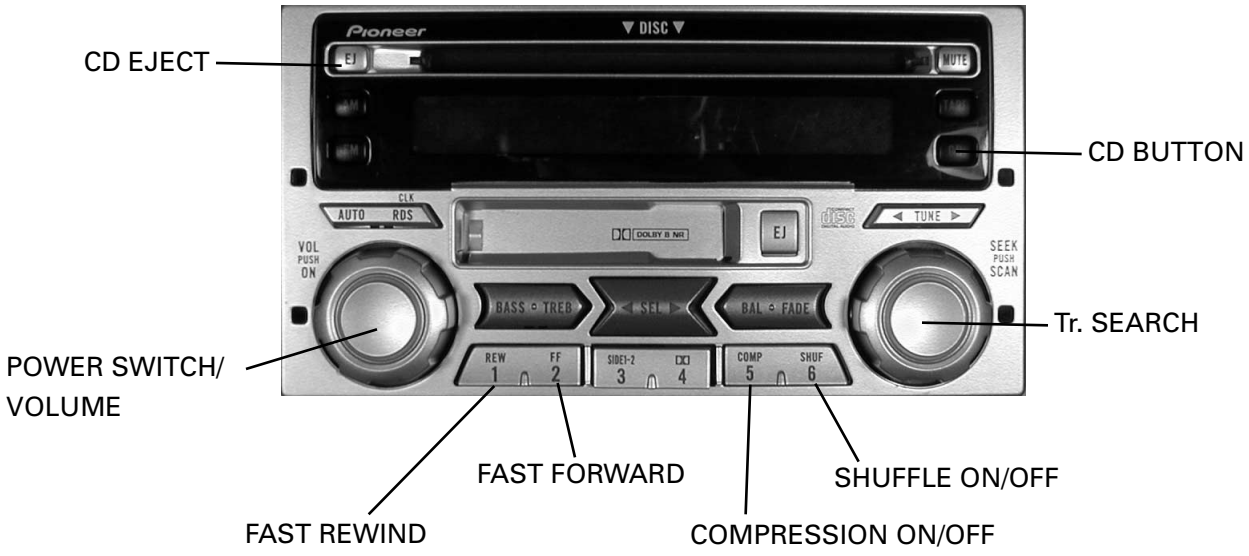
Portions to be cleaned	Cleaning tools
CD pickup lenses	Cleaning liquid : GEM1004 Cleaning paper : GED-008

8. OPERATIONS AND SPECIFICATIONS

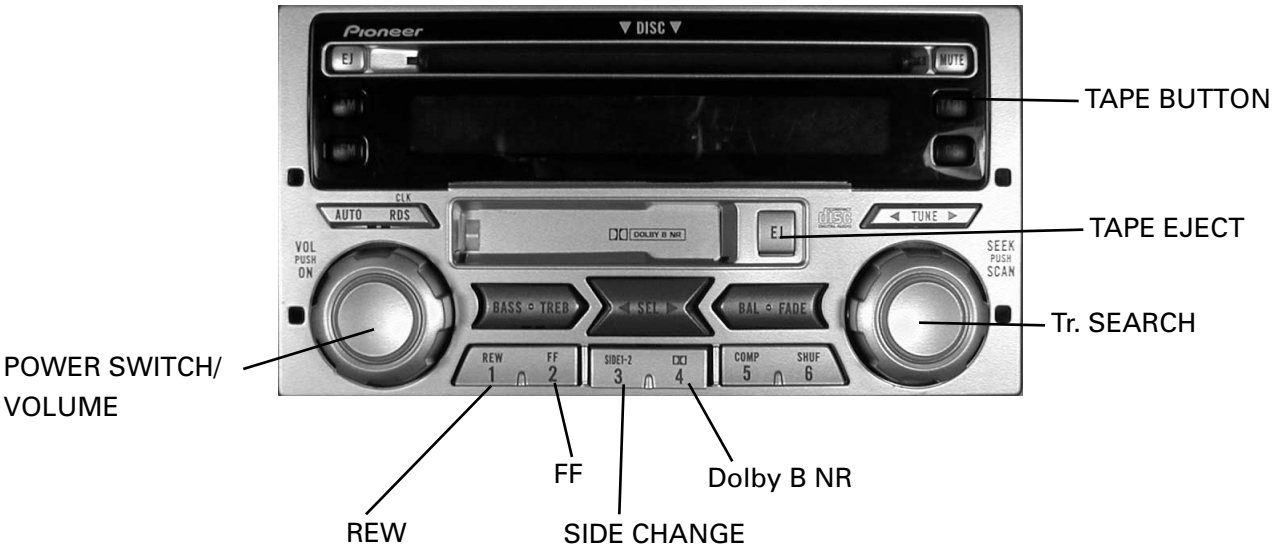
8.1 OPERATIONS

● RADIO

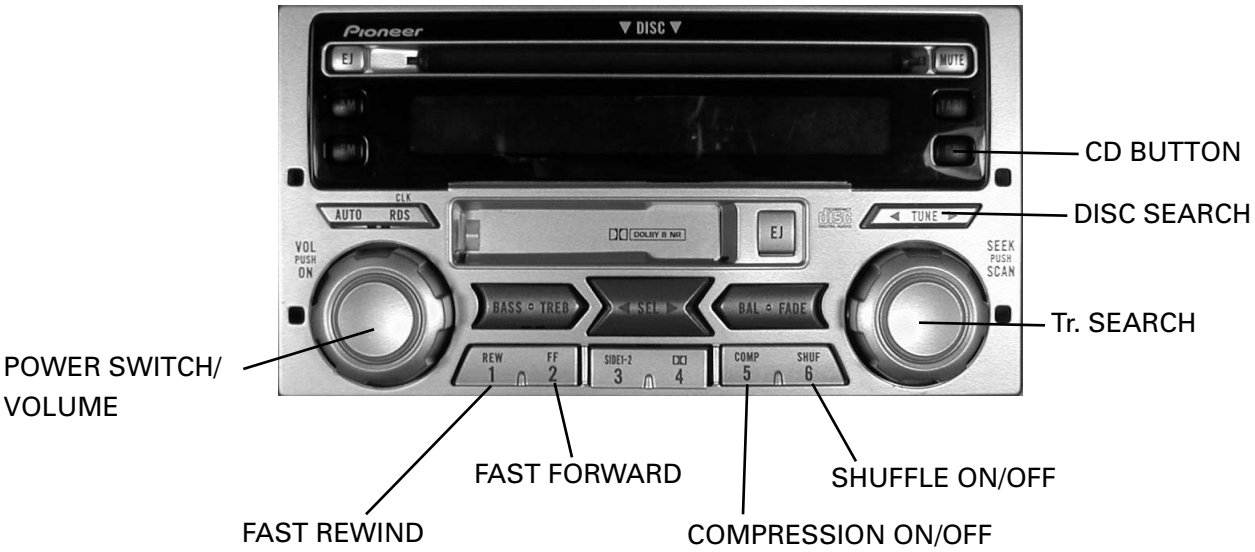
● CD



● TAPE



● CD MULTI



8.2 SPECIFICATIONS

Power source.....13.2 V(10.5-16.0 V allowable)
Grounding system.....Negative type
Dimensions.....188(W) X 100(H) X 180(D)mm
Weight .....2.7 Kg
Backup current.....5.3mA MAX.
Maximum power output....17.5 Ω X 4 (4W, THD 10 %, 1 kHz)
Load impedance.....4Ω

CD player
System .....Compact disc audio system
Usable discs.....Compact disc (8 / 12 cm)
Signal format .....Sampling frequency : 44.1 kHz
.....Number of guantization bits: 16 ; linear
Signal-to-noise ratio .....More than 65 dB ± 5dB
Distortion.....Less than 0.2 %

Cassette player
Tape.....Compact cassette tape(C30-C90)
Tape speed ...4.76cm / sec.(+0.14cm / sec.,-0.05cm / sec.)
Wow & flutter .....Less than 0.2 % (WRMS)
Cross talk .....More than 60 dB ± 10dB
Stereo separation .....More than 40 dB
Signal-to-noise ratio
(Dolby B out) .....More than 52 dB ± 5dB

FM tuner
Frequency range .....78.9 - 107.9 MHz
Usable sensitivity.Less than 11 dBf (mono, S / N : 30 dB)
Signal-to-noise ratio .....More than 62 dB ± 6 dB
Distortion.....Less than 2 %
Stereo separation .....More than 34 dB

AM tuner
Frequency range.....530 - 1710 kHz
Usable sensitivity .....Less than 29 dBμ ± 8dBμ
Selectivity .....More than 80 dB(±9 kHz)
Signal-to-noise ratio .....More than 50 dB ±6 dB
Stereo separation.....30 dB ±12 dB(1 kHz)

PIONEER®
The Art of Entertainment

Service Manual

ORDER NO.
CRT1829

CD MECHANISM MODULE

CX-597

- **This service manual describes the operation of the CD mechanism incorporated in models listed in the table below.**
- **When performing repairs use this manual together with the specific manual for model under repair.**

Model	Service Manual	CD Mechanism Module	CD Mechanism Unit
DEH-P825R/EW, DEH-P825/UC DEH-P823/ES, DEX-P99/UC	CRT1805	CXK5011	CXA8880
DEH-P725R/EW, DEH-P725R-W/EW DEH-P725/UC, DEH-P725-W/UC DEH-P723/ES, DEH-P625/UC DEX-P88/UC, DEX-P77R/EW	CRT1812	CXK5001	CXA8870
DEH-625R/EW, DEH-624R/EW DEH-525R/EW, DEH-524R/EW DEH-424R/GR, DEH-424/EW DEH-425/IT	CRT1808	CXK5001	CXA8870
DEH-59/UC, DEH-52/UC DEH-525/UC, DEH-49/UC DEH-42/UC, DEH-425/UC DEH-225/UC, DEH-523/ES DEH-323/ES, DEH-223/ES	CRT1809	CXK5001	CXA8870

CONTENTS

1. THE SUMMARY OF CIRCUITS 2
2. THE SUMMARY OF STRUCTURE 15
3. DISASSEMBLY AND ASSEMBLY 17

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 501 Orchard Road, #10-00, Lane Crawford Place, Singapore 0923

© PIONEER ELECTRONIC CORPORATION 1996

K-GFA. FEB. 1996 Printed in Japan

1. THE SUMMARY OF CIRCUITS

1.1 PRE-AMP SECTION (UPC2572GS: IC101)

This section processes the pickup output signals to create the signals for the servo, demodulator & control.

The pickup output signals are I-V converted by the pre-amp with built in photo-detector in the pickup, and added by the RF amp (IC101) to obtain the RF, FE, TE, TE zero cross, and other signals.

The main component is the UPC2572GS and each section is explained below. Because this system has a single power supply (+5V), the reference voltage for this IC, the PU and the servo circuit is the voltage REFO (+2.5V). The REFO signal is obtained by buffering REFOUT from the servo LSI (IC201: UPD63702GF) and is available from Pin 19 of IC101. All measurements should be done using this REFO as reference.

Note: During measurement, do not short REFO and GND.

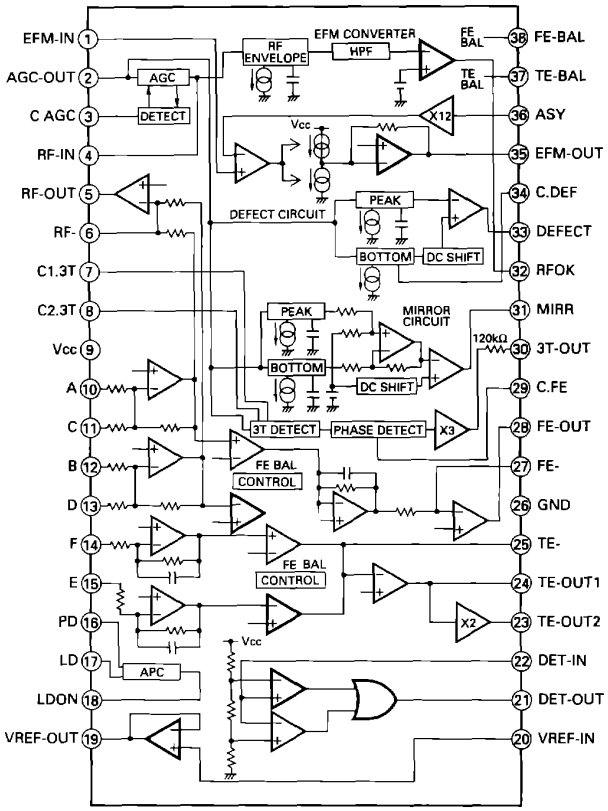


Fig.1 : UPC2572GS BLOCK DIAGRAM

1) APC Circuit (Automatic Power Control)

When the laser diode is driven with constant current, the optical output has large negative temperature characteristics. So the current must be controlled to hold the output constant with the monitor diode. The circuit that carries out this function is the APC circuit. The LD current is obtained by measuring the voltage between LD1 and ground and the value of this current is about 35mA.

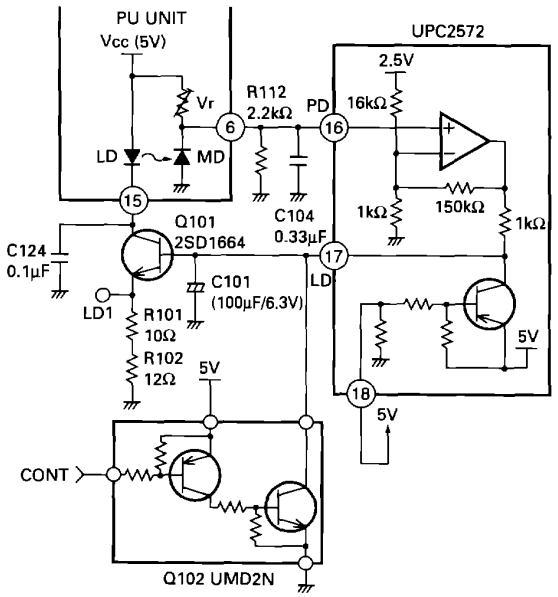


Fig.2 : APC CIRCUIT

2) RF Amp, RF AGC Amp

The photo-detector outputs (A+C) and (B+D) are added, amplified, and equalized in IC101 and output to the RFI pin. (The eye pattern can be checked at this pin.)

The RFI voltage low-frequency component is:

RFI = (A+B+C+D) × 3.22

R111 is the offset resistor for holding the RFI signal in the pre-amp's output range. The RFI signal is AC coupled and input to Pin 4 (RFIN pin).

This IC contains an RF AGC circuit, which holds the RFO output at Pin 2 at a fixed level (1.2 ± 0.2Vp-p). This RFO signal is used in the EFM, DFCT, and MIRR circuits.

3) EFM Circuit

This circuit, "squares" up the analog RF signal into a digital EFM signal. In order to ensure minimum errors it is necessary to use a feedback circuit to match the DC level of the threshold to the center of the RF waveform.

This circuit uses the fact that the EFM signal should have no DC component. By feeding back the EFM signal's DC level the threshold level changes until the DC level is zero and the threshold, by definition, is at the exact center of the RFO waveform. The filtering in the feedback has been adjusted to ensure minimum error. The EFM signal is output from Pin 35. The signal is a 2.5Vp-p amplitude signal centering on REFO.

4) DFCT (Defect) Circuit

The DFCT circuit detects defects on the disc surface, and outputs a "H" signal from Pin 33.

If there is dirt on the disc, drop outs may appear. The DFCT signal output is input to the servo LSI HOLD pin and the focus and tracking servo drives are held while the DFCT output is "H" in order to improve playability.

5) RFOK Circuit

This circuit produces the signal indicating the focus close state during play and the timing for closing the focus servo. This signal is output from Pin 32. This RFOK signal output is input to the servo LSI RFOK pin and the focus close command is issued by the servo LSI. This signal is high during play when the focus is closed.

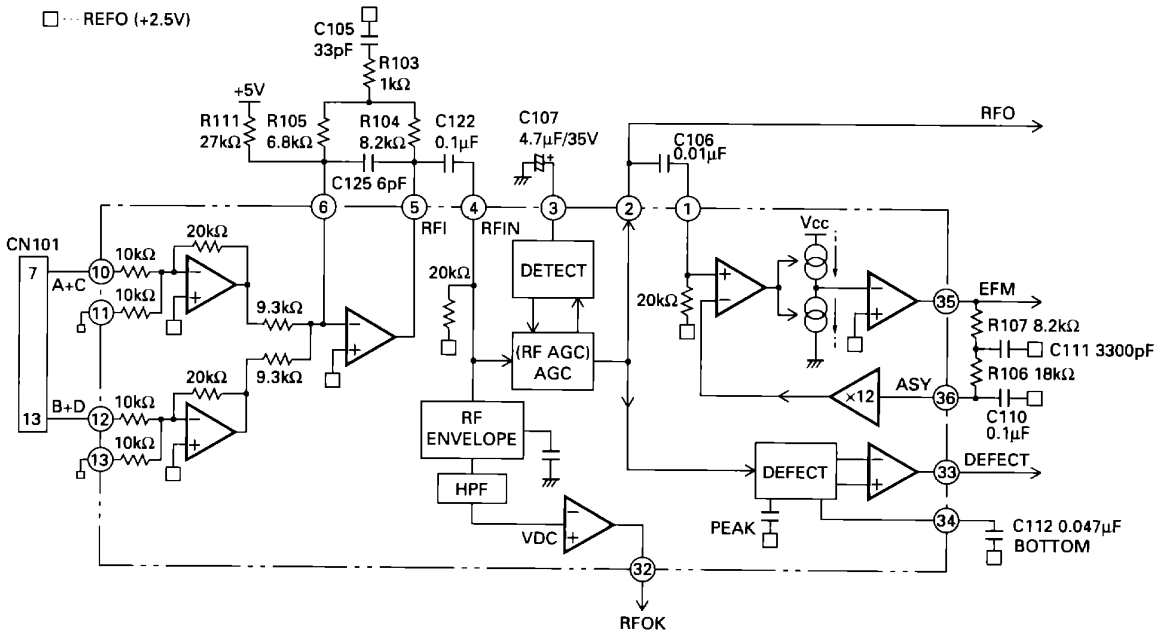


Fig.3 : RF AMP, RF AGC, EFM, DFCT, RFOK CIRCUIT

6) Focus Error Amp

The photo-detector outputs (A+C) and (B+D) are passed through a differential amp, and an error amp and (A+C-B-D) is output from Pin 28 as the FE signal.
The FEY voltage low-frequency component is:

$$FEY = (A+C-B-D) \times \frac{20k\Omega}{10k\Omega} \times \frac{90k\Omega}{68.8k\Omega} \times \frac{R108}{17.2k\Omega}$$

: (PU FE level × 5.02)

An S curve of about 1.6Vp-p is obtained with REFO as the reference. The final-stage amp cutoff frequency is 12.4kHz.

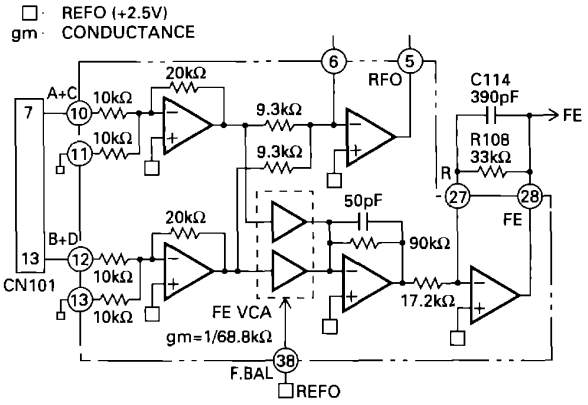


Fig.4 : FOCUS ERROR AMPLIFIER

7) Tracking Error Amp

The photo-detector E and F outputs are passed through a differential amp and an error amp and (E-F) is output from Pin 24 as the TE signal.
The TEY voltage low-frequency component is:

$$TEY = (E-F) \times \frac{63k\Omega}{(31k\Omega+16k\Omega)} \times \frac{R109}{17k\Omega}$$

: (PU TE output level × 5.36)

The TE waveform of about 1.5Vp-p with REFO as the reference is obtained as the TE output (Pin 24). The final-stage amp cutoff frequency is 19.5kHz.

8) Tracking Zero Crossing Amp

The tracking zero crossing signal (below, TEC signal) is the TE waveform (Pin 24 voltage) amplified four times and is used to find the zero crossing points of the tracking error with the UPD63702GF servo LSI. This zero crossing point is found for the following two reasons.

(1) To count tracks for carriage moves and track jumps
(2) To detect the direction in which the lens is moving for tracking closing (This is used in the tracking brake circuit, described Page 9 b).)

The TEC signal frequency range is 500Hz - 19.5kHz.

TEC voltage = TE level × 4

In other words, the TEC signal level is calculated at 6Vp-p. This level exceeds the op-amp's output range and the signal is clipped, but this can be ignored because this signal is used by the servo LSI only at the zero crossing point.

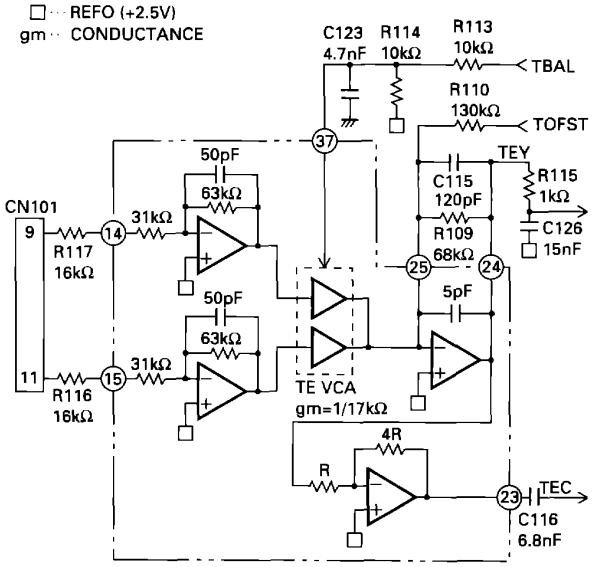


Fig.5 : TRACKING ERROR AMPLIFIER & TRACKING ZERO CROSSING AMPLIFIER

9) MIRR (Mirror) Circuit

The MIRR signal shows the on track and off track data and is output from Pin 31.

When the laser beam is

On track: MIRR = "L"

Off track: MIRR = "H"

This signal is used in the brake circuit, described Page 9 b).

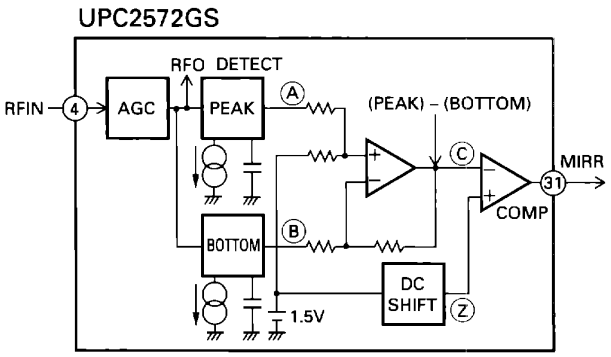


Fig.6 : MIRR CIRCUIT

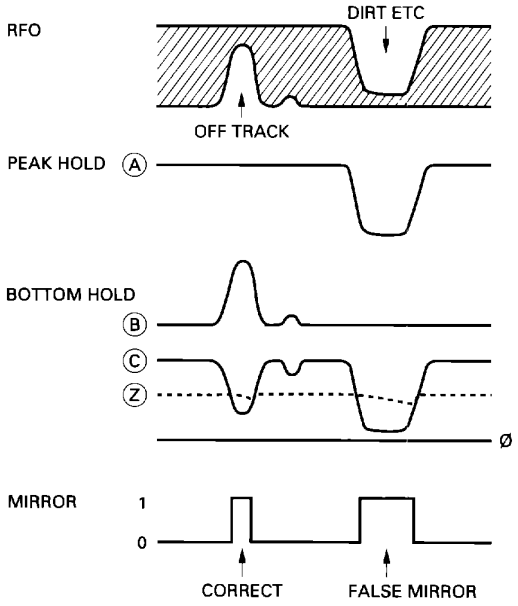


Fig.7 : MIRR CIRCUIT & SIGNAL DIAGRAM

10) 3TOUT Circuit

This circuit detects variations of the RF signal when an external interference is input into the focus servo loop and outputs the phase difference between the FE signal and the RF level variation signal from Pin 30. The signal has been passed through a low-pass filter (fc = 40Hz). This signal is used for the FE bias automatic adjustment, described Page 12 4).

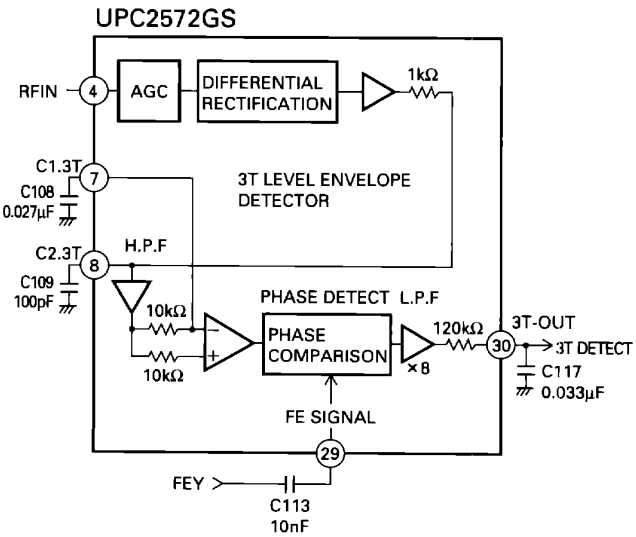


Fig.8 : 3T OUT CIRCUIT

1.2 SERVO SECTION (UPD63702GF: IC201)

This section can be divided into two parts.
One is the servo processing section, which handles such servo controls as error signal equalizing, in focus, track jump, and carriage move. The other is the signal processing section, which handles data decoding, error correction, and interpolation processing.
This IC converts the FE and TE signals from analog to digital and outputs the focus, tracking, and carriage drive signals via the servo block. Also, the EFM signal from the pre-amp is decoded in the signal processing section and finally output as audio signals after D/A conversion. (This IC has a built in audio digital-analog converter.) The decoding process also creates the spindle servo error signals, which is fed to the spindle servo block to create the spindle drive signal.
The focus, tracking, carriage, and spindle drive signals are then amplified by IC301, XLA6997FP and fed to their respective actuators and motors.

1) Focus Servo System

The main focus servo equalizer is in the UPD63702GF. Figure 9 is the focus servo block diagram.
In the focus servo system, the lens must be brought within the in-focus range for focus closing. Therefore, the lens is raised and lowered according to the triangular focus search voltage to find the focus point. During this time the spindle motor is kicked and kept rotating at a set speed.
The servo LSI monitors the FE signal and the RFOK signal and automatically carries out the focus close operation at the appropriate point.
Focus closing is carried out when the following four conditions are all met.
(1) The lens is moving from far to near toward the disc surface.
(2) RFOK = H
(3) The FZD signal (within the IC) is latched at high.
(4) FE = 0 (REFO reference)

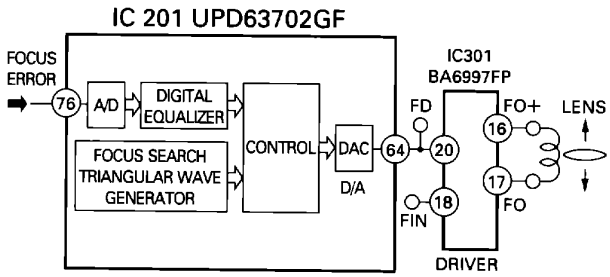


Fig.9 : FOCUS SERVO BLOCK DIAGRAM

When the above conditions are all met and the focus is closed, the XSO signal is shifted from high to low, then 40ms later, the microcomputer begins to monitor the RFOK signal that is passed through the low pass filter.
When the RFOK signal is judged to be low, the microcomputer carries out various actions such as protection.
Figure 10 shows the series of operations for focus closing (for the case where focus cannot be closed.) Also, in focus-mode-selection during test mode when the display is 01, if the focus close button is pressed, the S curve, search voltage, and actual lens movements can be checked.

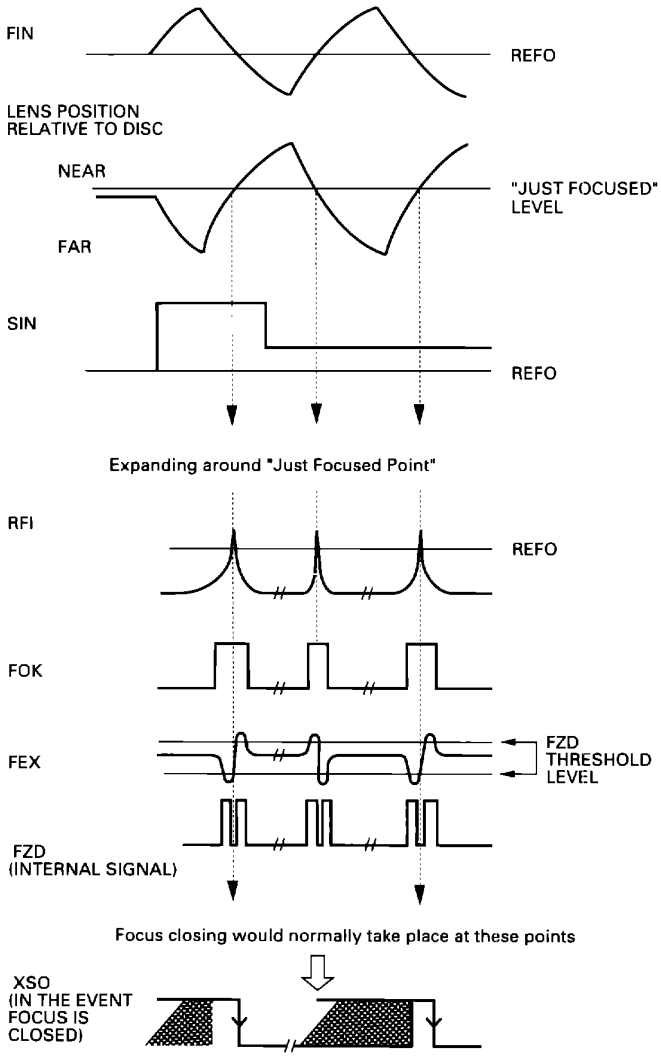


Fig.10 : FOCUS CLOSING SEQUENCE

2) Tracking Servo System

The main tracking servo equalizer is in the UPD63702GF. Figure 11 is the tracking servo block diagram.

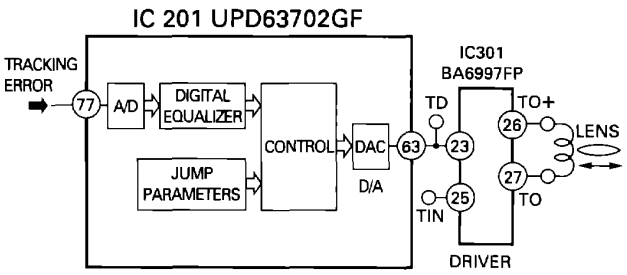


Fig.11 : TRACKING SERVO BLOCK DIAGRAM

a) Track Jump

When the LSI receives the track jump command from the microcomputer, the track jump is carried out automatically by the auto sequence function within the LSI. This system has six types of track jumps used for searches: 1, 4, 10, 32, 32 × 2, and 32 × 3. In test mode, in addition to these jumps, CRG moves can be executed and checked by mode selection. For track jumps, the microcomputer sets half of the total number of jumps (2 tracks for a 4 track jump) and counts the set number of tracks using the TEC signals. From the point when it has counted the set number of tracks, it outputs the brake pulse for a fixed period of time (set by the microcomputer) to stop the lens. In this way, it can close the tracking and continue normal play.

To improve the servo loop re-closing performance just after track jump, the brake circuit comes on for 60ms after the end of the brake pulse and the tracking servo gain is increased.

Fast forward and reverse operations in normal mode are realized by executing consecutive single track jumps. The speed is about 10 times as high as in normal play.

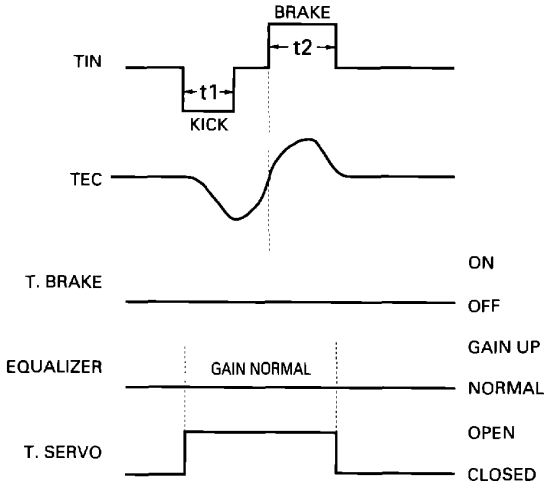


Fig.12 : SINGLE TRACK JUMP

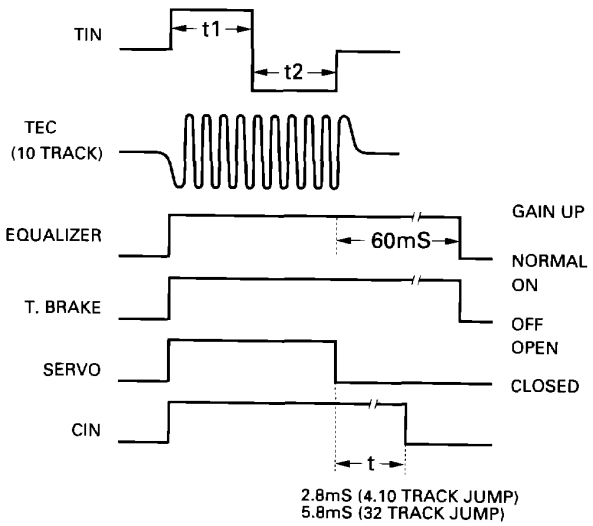
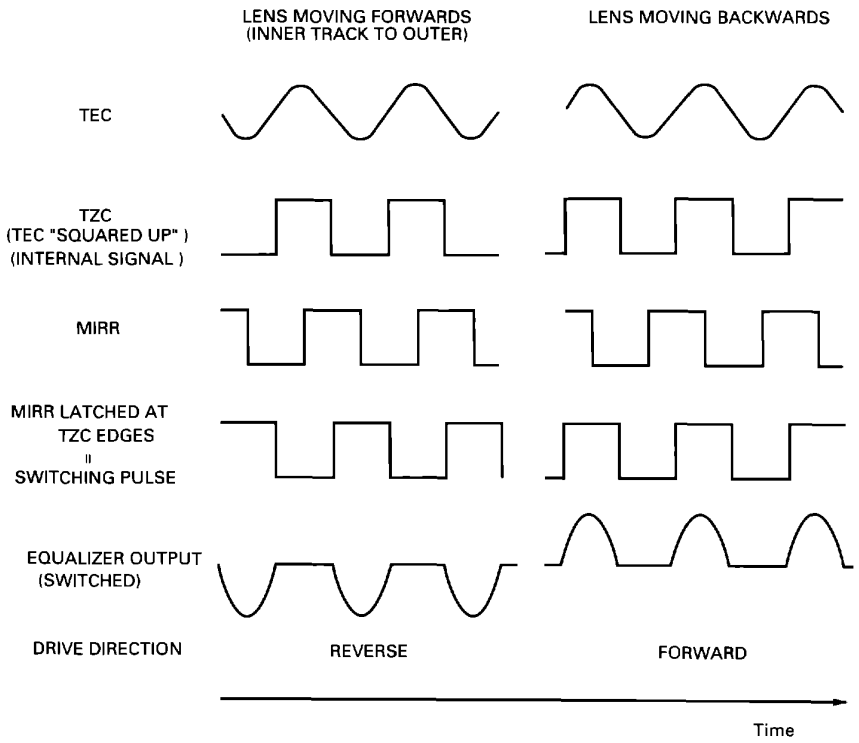


Fig.13 : MULTI-TRACK JUMP

b) Brake Circuit

This relies on determining which direction the lens is moving and only outputting the portion of the drive waveform which acts to oppose this motion. Direction of motion is deduced from TEC and the MIRR signal and knowledge of their phase relation.



Note: Equalizer output assumed to hava same phase as TEC.

Fig.14 : TRACKING BRAKE CIRCUIT

3) Carriage Servo System

The carriage servo supplies the tracking equalizer's low-frequency component (lens position information) output to the carriage equalizer and after applying a fixed amount of gain, outputs the drive signal from the servo LSI. This signal is applied to the carriage motor through the driver IC.

When the lens offset reaches a certain level during play, the entire PU must be moved in the forward direction. Therefore, the equalizer gain is adjusted to output a voltage higher than the carriage motor starting voltage. In actual operations, a certain threshold level is set for the equalizer output within the servo LSI and the drive voltage is output from the servo LSI only when the equalizer output level exceeds that threshold level. This reduces power consumption. Also, due to disc eccentricity and other factors, the equalizer output voltage may cross the threshold level a number of times before the entire PU starts to move. In this case, the drive voltage waveform, (which is applied) from the LSI, becomes pulsative.

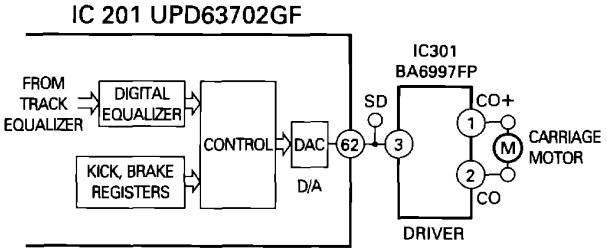


Fig.15 : CARRIAGE SERVO CIRCUIT

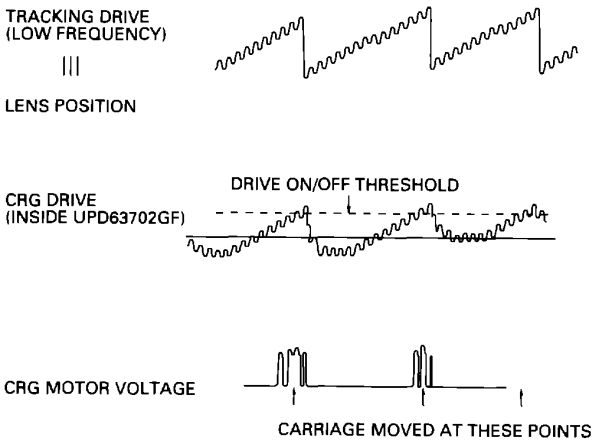


Fig.16 : CARRIAGE WAVEFORM

4) Spindle Servo System

The spindle servo has the following modes.

(1) Kick: The mode used for disc rotation acceleration during setup

(2) Offset:

a) Used during setup from the end of kick until the AGC end

b) Used during play when the focus is unlocked until it is recovered

Both of these are for holding the disc rotation rate near the normal rotation rate.

(3) Adaptive servo: CLV servo mode for normal operation

In the EFM demodulation block, the frame sync signal and internal frame counter output signal are sampled each WFCK/16 and a signal is produced indicating whether or not they match. Only after this signal is in non-match mode eight consecutive times, is the system treated as out of sync, at other times it is treated as in sync. In this adaptive servo mode, a servo mode for pulling the system into sync is automatically selected when the system is out of sync and the regular servo is automatically selected when the system is in sync.

(4) Brake: The mode for stopping the spindle motor rotation

The brake voltage is output by the microcomputer from the servo LSI. At this time, the EFM wave form is monitored within the LSI and if the longest EFM pattern exceeds a certain interval (when the rotation is slow enough), a flag is registered within the LSI and the microcomputer switches the brake voltage off. If the flag is not registered within a certain period of time, the microcomputer switches from brake mode to stop mode which lasts for a fixed period of time. In this case, ejection of the disc can only occur after this period of time.

(5) Stop: The mode used during power on and ejection

At this time, the voltage across the spindle motor is 0V.

(6) Rough servo: The mode used for carriage feed (carriage move during a long search)

The linear speed is calculated from the EFM wave form and a high level or low level is input to the spindle equalizer. In test mode, this mode is also used for the grating check.

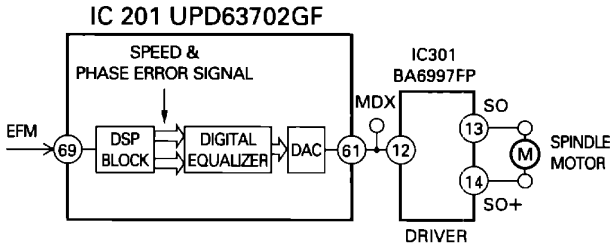


Fig.17 : SPINDLE SERVO BLOCK DIAGRAM

1.3 AUTOMATIC ADJUSTMENT FUNCTIONS

This system uses a pre-amp (UPD2572GS) and servo LSI (UPD63702GF) to automate all circuit adjustment. All adjustments are carried out automatically each time a disc is inserted or the CD mode is selected with the source key. Here is how each automatic adjustment works.

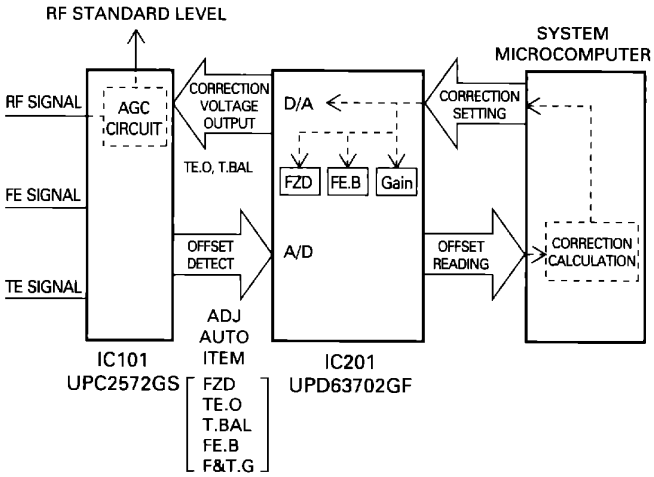


Fig.18 : AUTOMATIC GAIN CONTROL

1) FZD Cancel Setting

This setting is to make the focus closing reliable. When the power is switched on, the FE offset level is read and a voltage opposite to this offset value is written to the CRAM in the IC to cancel the offset. In this way, the FZD threshold level can be set to a constant value (+150mV) and one of the conditions within the IC for focus closing "that the FZD signal is latched at high" can be fulfilled reliably.

2) TE Offset Automatic Adjustment

This function adjusts the pre-amp TE amp offset to 0 V when the power is switched on.

The adjustment procedure is:

(1) The TE offset (LD off) is read by the microcomputer via the servo LSI (offset = TE1).

(2) The microcomputer calculates the voltage to be corrected from the value of TE1 and sets the output of Pin 65 of the servo LSI (signal name: TOFST). The concrete calculation method is as follows.

TOFST2 = TOFST1 + TE1 × R110/R109

3) Tracking Balance Automatic Adjustment

This adjustment equalizes the difference in sensitivity of the E channel and F channel of the TE output. In actual practice, the TE waveform is adjusted to be vertically symmetrical about REFO.

The adjustment procedure is:

(1) After focus closing, the lens is kicked in the radial direction to reliably generate the TE waveform.

(2) At this time, the microcomputer reads the peak and bottom of the TE waveform through the servo LSI.

(3) The microcomputer calculates the value of the offset and the correction voltage to output from Pin 66 of the servo LSI (signal name: TBAL).

(4) The voltage output from the servo LSI is input to Pin 37 of the pre-amp (IC101: UPC2572). This pin is the TEVCA amp control voltage pin. The gain for the E channel and F channel within the pre-amp is varied according to the input voltage to adjust the tracking balance and make the TE waveform vertically symmetrical about REFO.

4) FE Bias Automatic Adjustment

This adjustment is made to maximize the RFI level during play by optimizing the focus point. This adjustment utilizes the phase difference between the RF waveform 3T level signal and the focus error signal. Since an external interference is input into the focus loop, this adjustment uses the same timing as the auto gain control, explained below.

The adjustment procedure is:

(1) External interference is injected into the focus loop by command from the microcomputer (within the servo LSI).

(2) The RF signal 3T component level variation is detected within the pre-amp.

(3) The phase difference between the FE signal due to external interference input and the above 3T component is detected, to sense the focus deviation direction, and the result is output as a DC voltage from Pin 30 (3T-OUT) of the pre-amp.

(4) The 3T-OUT voltage is input to Pin 75 (A/D port) of the servo LSI and the microcomputer reads the 3T-OUT voltage through the servo LSI.
(5) The microcomputer calculates the required correction and adjusts the focus loop offset in the servo LSI.

In the same manner as the auto gain control, this adjustment is repeated a number of times to raise the adjustment precision.

5) Auto Gain Control (AGC)

This adjustment has already been used in the previous generation of CD modules. This function automatically adjusts the focus and tracking servo loop gain.

The adjustment procedure is:

(1) External interference is injected into the servo loop.
(2) The error signals (FE, TE) when the external interference is injected are passed through a band pass filter and the G1 and G2 signals are obtained.
(3) The microcomputer reads the G1 and G2 signals through the servo LSI.
(4) The microcomputer calculates the required correction and adjusts the loop gain within the servo LSI.

To raise the adjustment precision, the same adjustment procedure is repeated a number of times.

6) Initial Adjustment Values

All the automatic adjustments use the previous adjustment value as the initial value as long as the microcomputer power supply is not cut off (the backup is not cut off). If the backup is cut off, automatic adjustment does not start from the previous adjustment value, but rather from the default setting.

7) The Coefficient Display for Adjustment Result

The results of all automatic adjustments can be displayed and checked in test mode.

The coefficient displays for each automatic adjustment are as follows.

(1) FZD cancel, TE.OFST cancel, T.BAL, FE.bias
Reference value = 32 (A coefficient of 32 indicates that no adjustment was necessary).
The display is in units of about 40mV.
Example: FZD cancel coefficient = 35
35-32 = 3 $3 \times 40mV = 120mV$
Since the corrected value is approximately + 120mV, the FE offset before adjustment was - 120mV.

(2) Focus and tracking gain adjustment
Reference value: Focus = 13, tracking = 20
The coefficient display shows the gain derease relative to the reference value.
Example: AGC coefficient = 40
Gain = 20log (20/40) = - 6dB

1.4 POWER SUPPLY AND LOADING SECTION

The power supply within the system makes the loading motor drive power supply VM (7.6V) and 5V Reg IC power (6.9V) from VD (8.3V) supplied by the mother board. The disc detection LED drive voltage and the CD driver IC power supply use VD directly.

The microcomputer switches the CD driver and laser diode on/off with "CONT" and switches the 5V power on/off with "CD5VON". There is no particular control pin for the loading motor driver, but the "EJ" and "LOAD" input signals serve the same role.

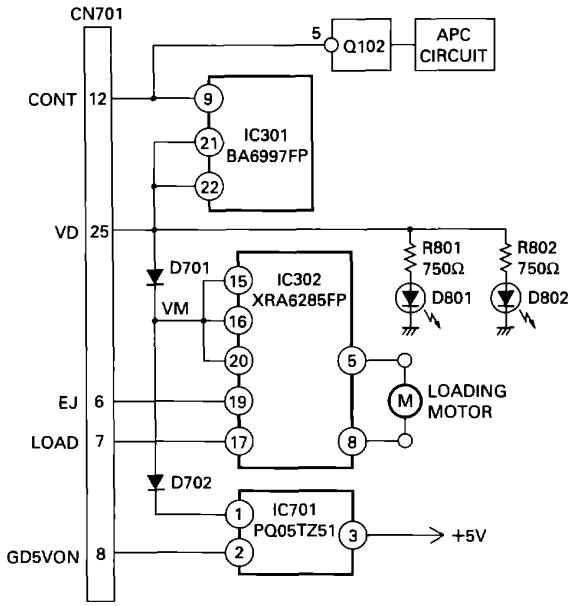


Fig.19 : POWER SUPPLY & LOADING SECTION

2. THE SUMMARY OF STRUCTURE

● Disc Loading Operations

1. There are two photo transistors before and after the rubber roller that conveys the disc. They receive light from the corresponding two LEDs. (When light is received, the photo transistor voltage is low.)
2. When a disc is inserted to just before the rubber roller, the front section photo transistor (P1) voltage goes high and the loading motor drive starts.
3. The drive power of the motor is transmitted by gear and the rubber roller rotates to transport the disc.
   The rubber roller is at one end of the loading arm and lifts up the guide arm. The guide arm is positioned by two springs. Therefore the guide arm and the rubber roller provide the appropriate pressure to feed out the disc between them.
4. The clamper arm also has a disc centering mechanism that discriminates the size of the disc and clamps the disc at the center of the spindle motor. The centering arms form a set left and right on the clamper arm and can move centering on their pivots. At the end of the centering arms are the lock arms. (The lock arms rotate about the centering pins and are locked to the clamper arm for 8cm discs.)
   For 12cm discs, the lock arms are unlocked and move to the position indicated in Figure 21.
   The detection arm, which has its center of rotation on the centering arm on the right side of the diagram, has different positions for 8cm and 12cm discs. When one of these discs is positioned on the spindle, the detection arm moves clockwise according to the external diameter of the disc and moves the detection lever to the bottom side of the figure.

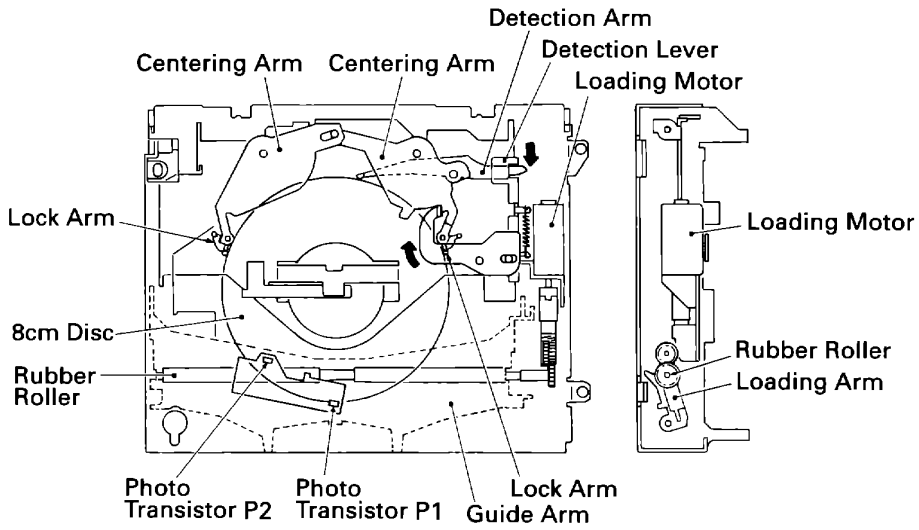


Fig.20

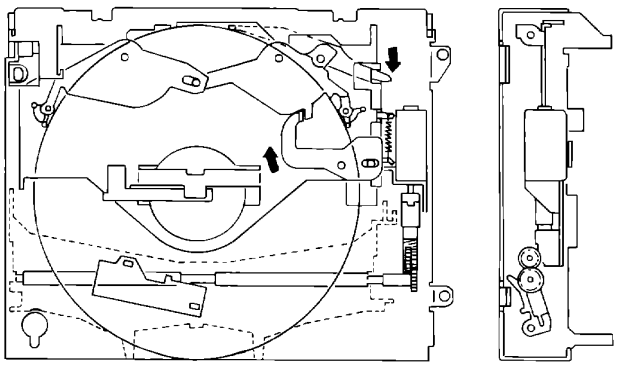


Fig.21

● Clamp Operation

The rack gear touching the detection lever meshes with the gear driven by the loading motor and rotates the L arm in the direction of the arrow in Figure 23.
The clamper arm, lifted up by the L arm, descends and clamps the disc. Also, the lock lever linked with the L arm moves the loading arm.
Because of this, the rubber roller descends, separating from the disc. At the same time the guide arm also descends. Loading ends at the position where the lock lever switches on the clamp switch.

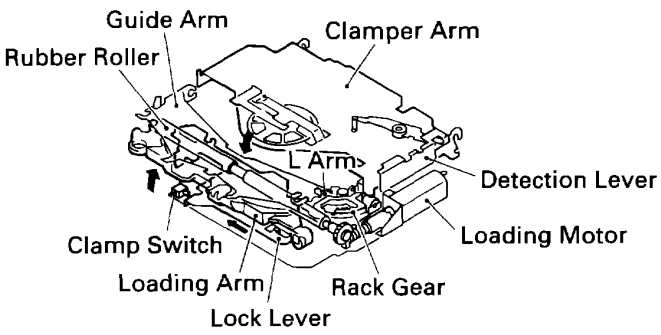


Fig.22

● Mechanism Lock Operation

1. In the eject state, both ends of the loading arm touch the bottom of the frame, the floating section front side is pushed down against the resistance of the mechanism suspension spring, and the disc insertion height position is found.
   For play, the loading arm rotates and the separation of the two ends from the frame bottom releases the floating section.

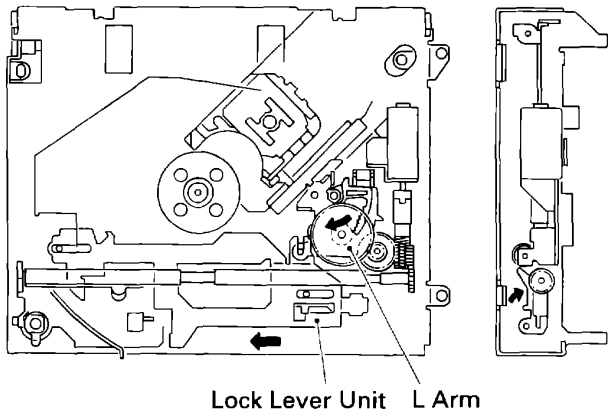


Fig.23

● Eject

1. The eject mechanism operates by reversing the rotation which takes place when the loading motor loads. The L arm moves and operates the mechanical lock, the clamp is released, the roller is applied, and the disc is conveyed. Loading stops when the photo transistor to the rear of the rubber roller (P1) is illuminated.
   However, in case of an 8cm disc, motor revolution stops a fixed period of time after P2 is illuminated. The disc type is recognized during play, by the voltage of the photo transistor (P1) located in front of the rubber rollers.

3. DISASSEMBLY AND ASSEMBLY

Remove in the order of the circled numbers in the disassembly diagram.

1. Remove the CD Mechanism Module

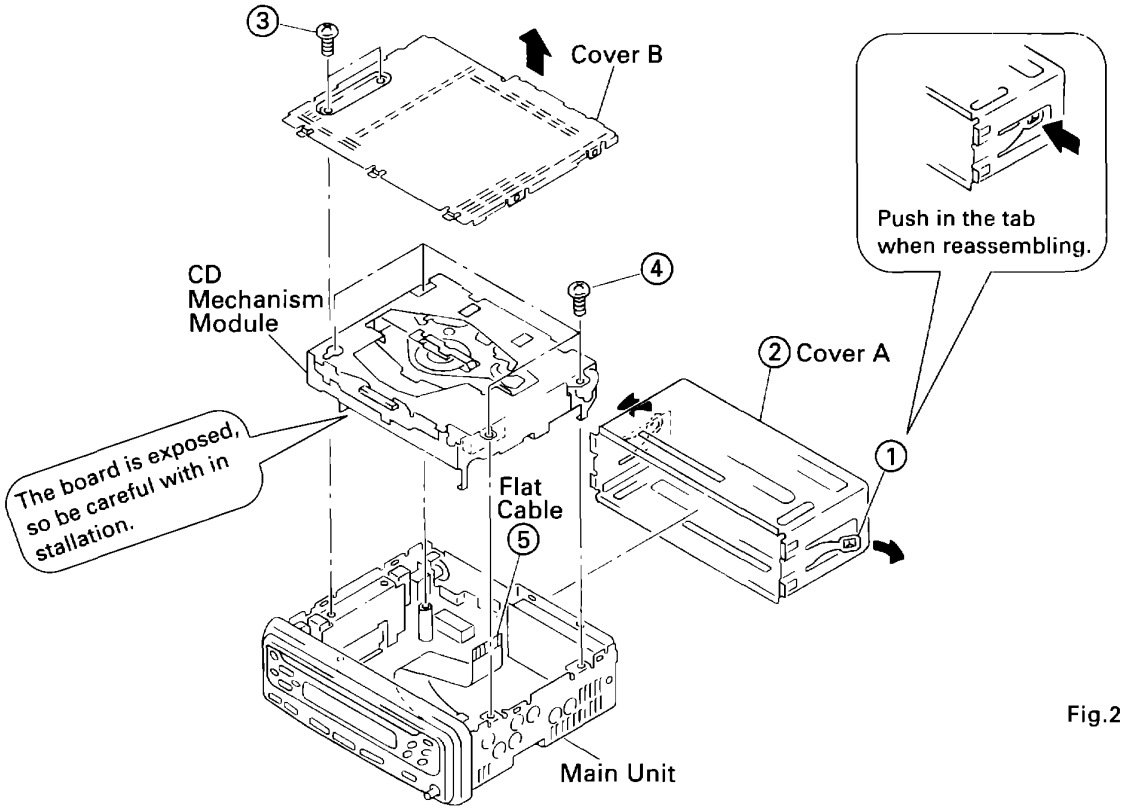


Fig.24

2. Remove the Damper and the Frame Unit

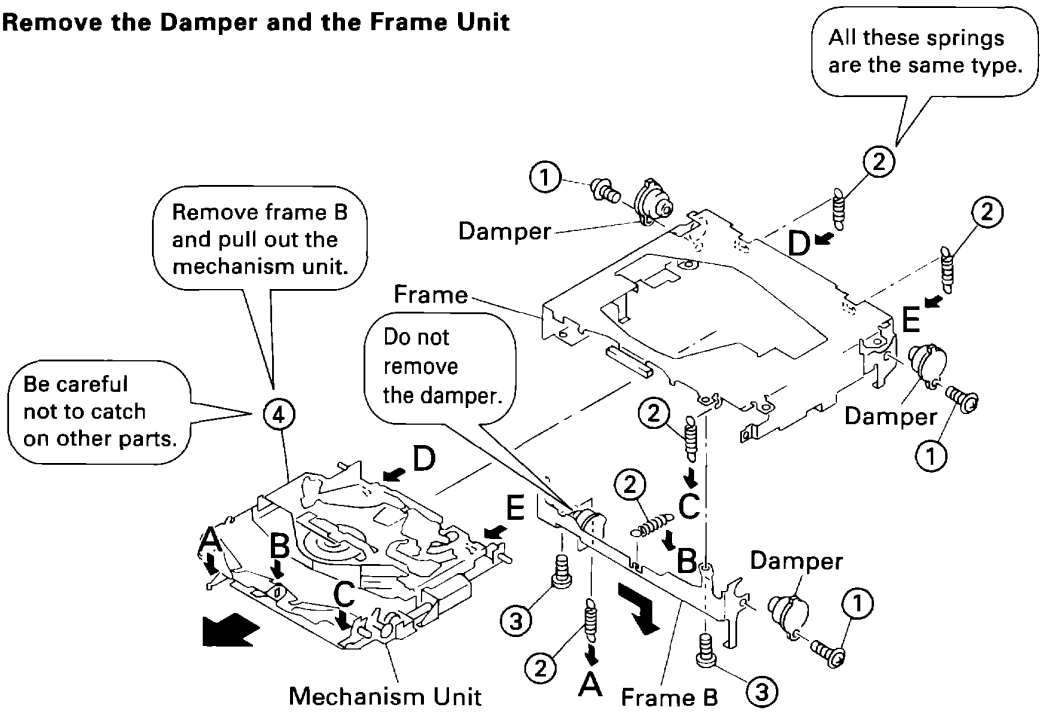


Fig.25

3. Remove the Spindle Motor

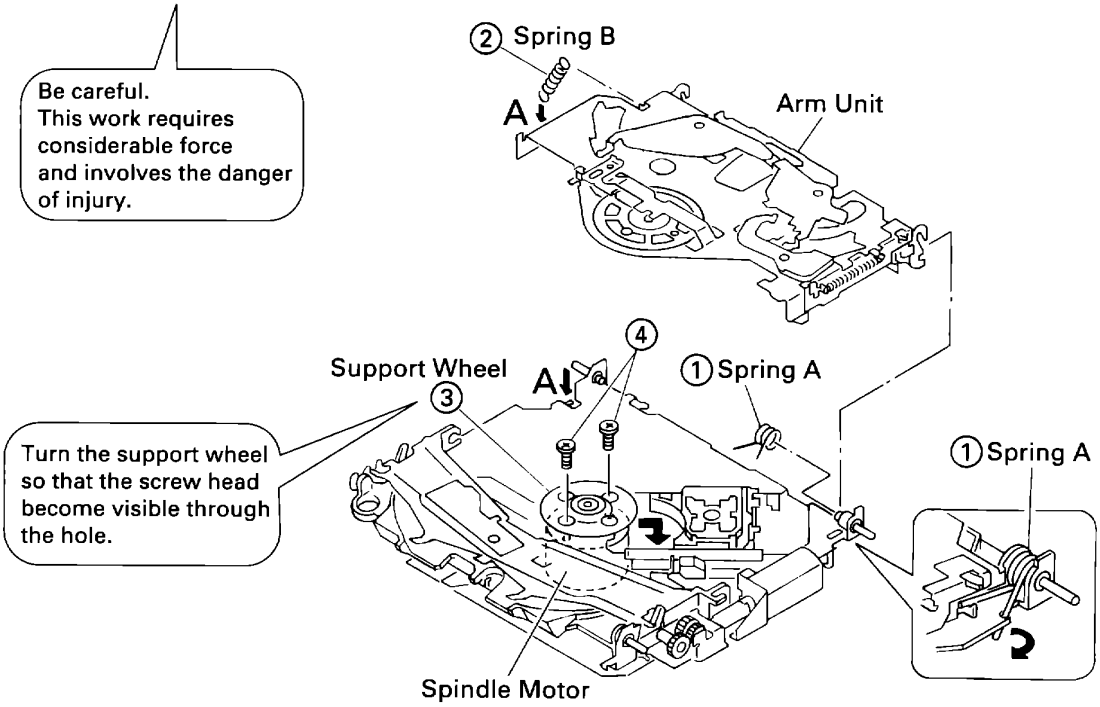


Fig.26

4. Remove the Loading Motor

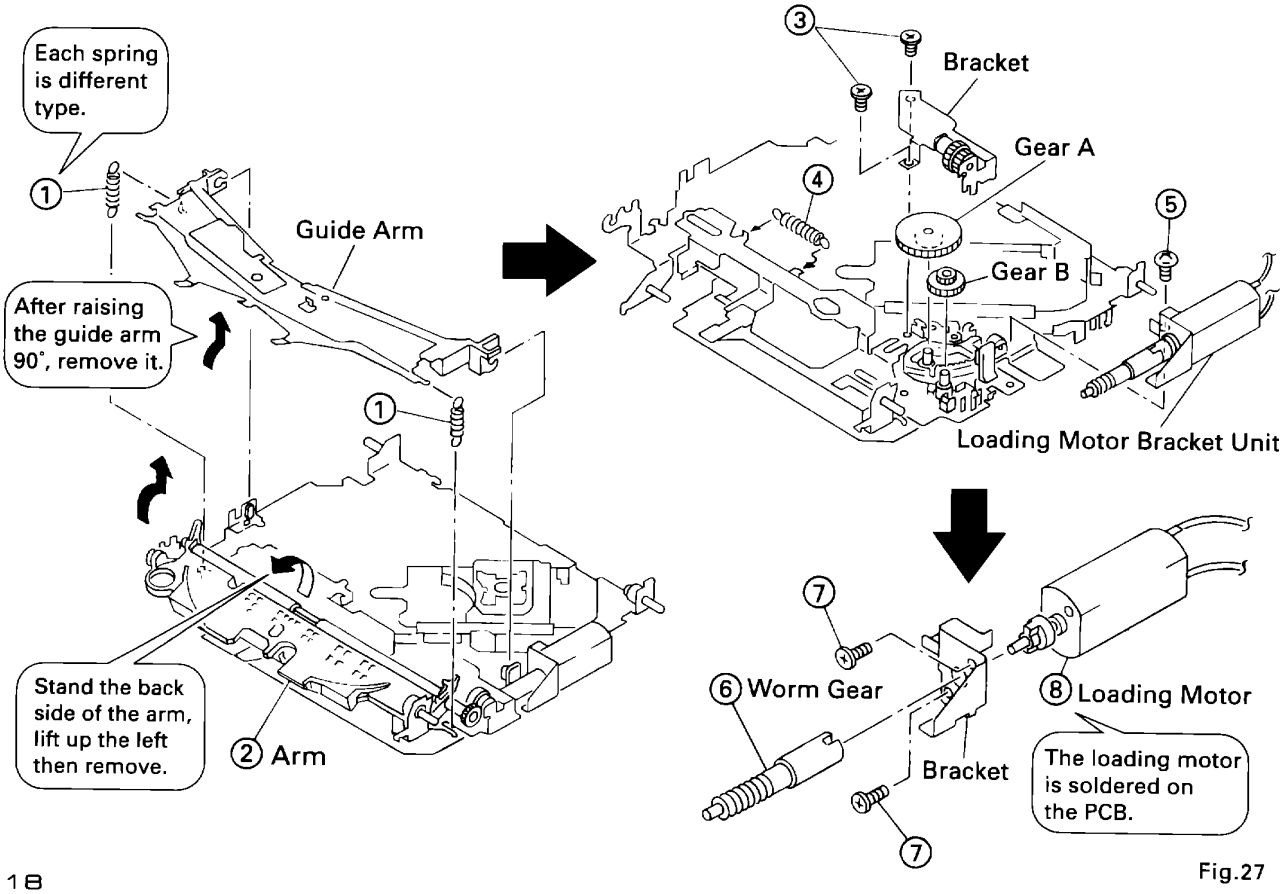


Fig.27

5. Remove the PU Unit and the Carriage Motor

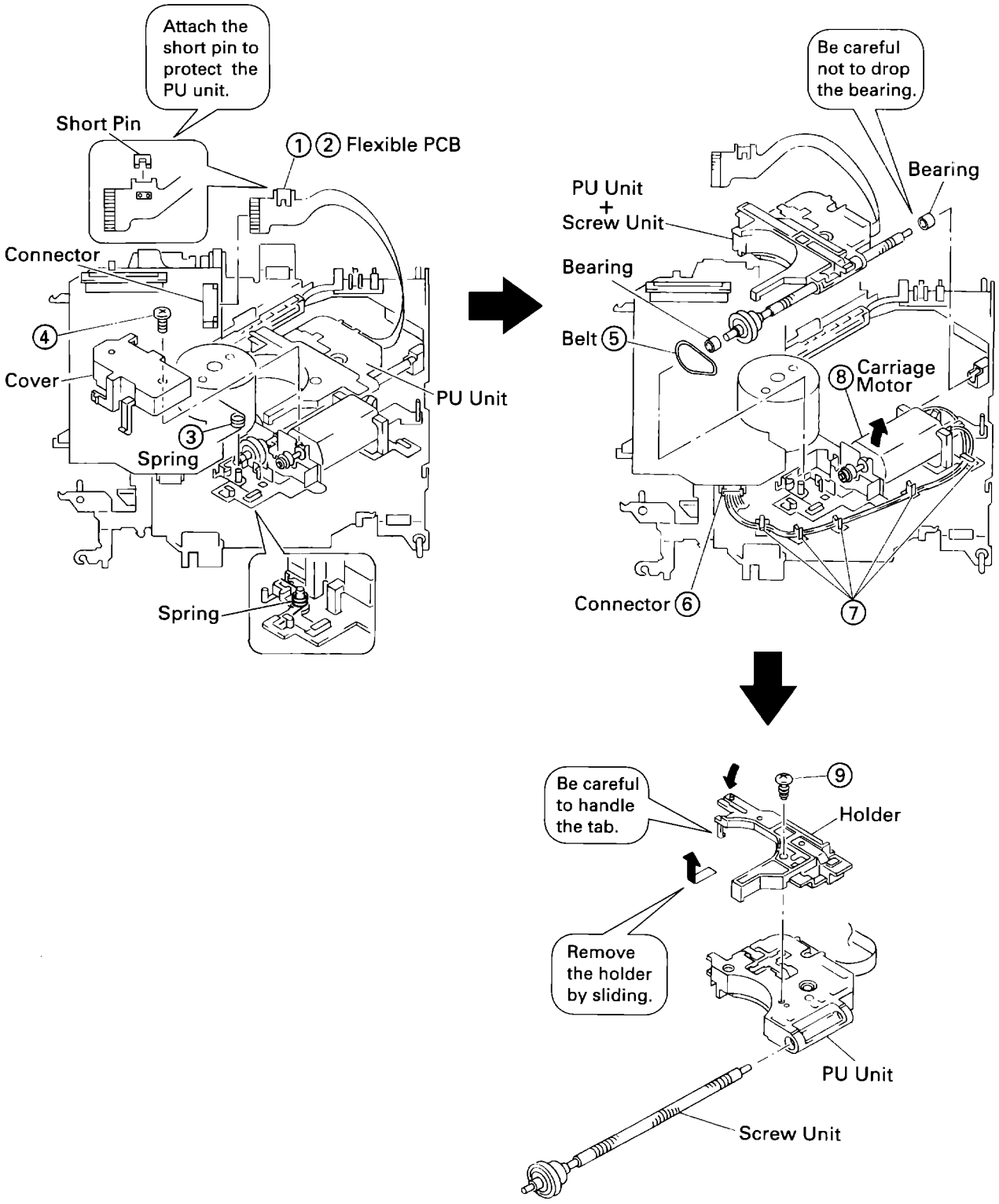


Fig.28

Service Manual

ORDER NO.
CRT2406

CASSETTE MECHANISM MODULE(3L)

CX-1011

- **This service manual describes operation of the cassette mechanism incorporated in models listed in the table below.**
- **When performing repairs use this manual together with the specific manual for model under repair.**

Model	Service Manual	Cassette Mechanism Module	Deck Unit
KEH-P5900R/X1M/EW	CRT2399	EXK4000	EWM1023
KEH-P4900R/X1M/EW	CRT2399		
KEH-P4930R/X1M/EW	CRT2399		
KEH-P490/X1M/UC	CRT2398		
KEH-P4900/X1M/UC	CRT2398		
KEH-P4950/X1M/ES	CRT2398		
KEH-P4950J/X1M/ES	CRT2400		
KEH-P6900R/X1N/EW	CRT2429	EXK4010	EWM1024
KEH-P690/X1N/UC	CRT2430		
KEH-P6950/X1N/ES	CRT2430		
KEH-P6910R/X1N/EE	CRT2429		
KEH-P5900/X1N/UC	CRT2431		
KEH-P5950/X1N/ES	CRT2431		
KEH-3930R/X1M/EW	CRT2420	EXK4100	EWM1023
KEH-3900R/X1M/EW	CRT2420		
KEH-3910/X1M/EE	CRT2420		
KEH-3950/X1M/ES	CRT2421		

CONTENTS

1. MECHANISM DESCRIPTION AND GREASING.....2
2. GREASE APPLICATION LOCATION AND GREASE NAME 12
3. DISASSEMBLY.....28
4. ADJUSTMENT 29

PIONEER CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, CA 90801-1760 U.S.A.
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE.LTD. 253 Alexandra Road, #04-01, Singapore 159936

© **PIONEER CORPORATION 1999**

K-ZZB. OCT. 1999 Printed in Japan

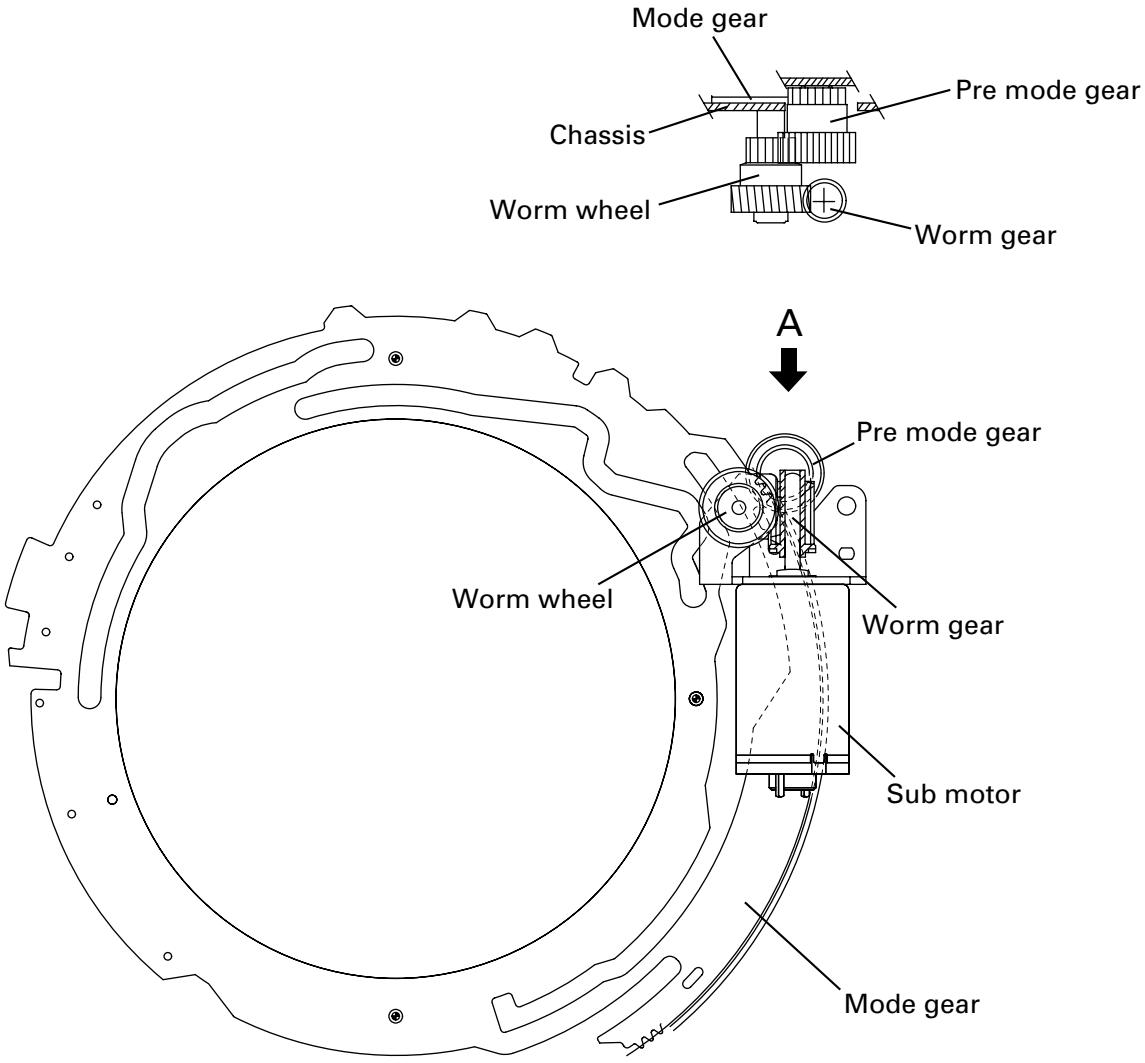
1. MECHANISM DESCRIPTION

1.1 DRIVE OPERATION

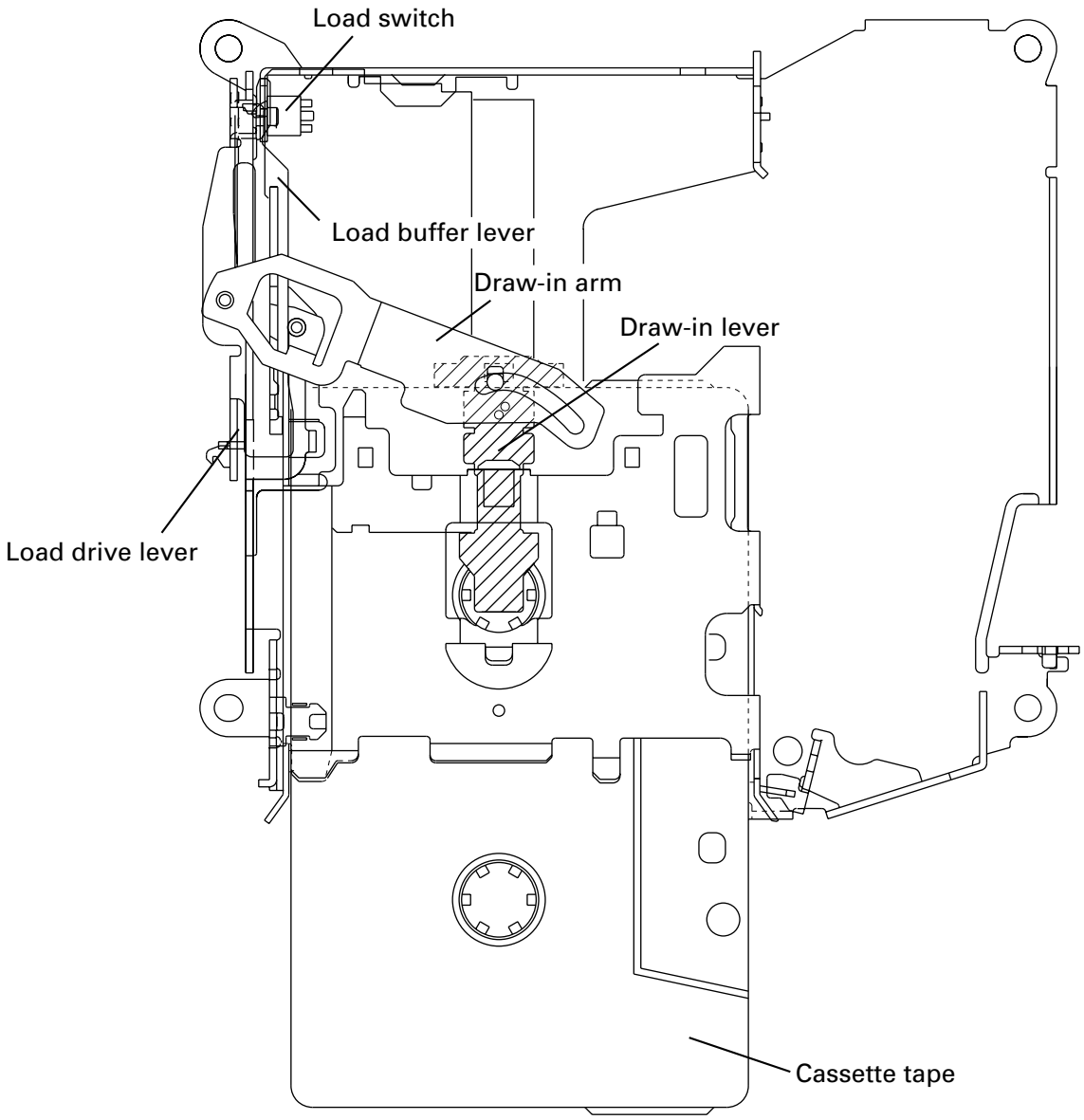
Inserting the cassette tape → Draw in → Put in down → Release ⟷ Forward play ⟷ REW ⟷ FF ⟷ Reverse play

Eject ← Draw out ← Lift ←

All motive force(except that for tape running) is supplied by the sub-motor.
All the operation modes including tape insertion and ejection are switched via the mode gear.



1.2 LOADING AND EJECT OPERATIONS(1)



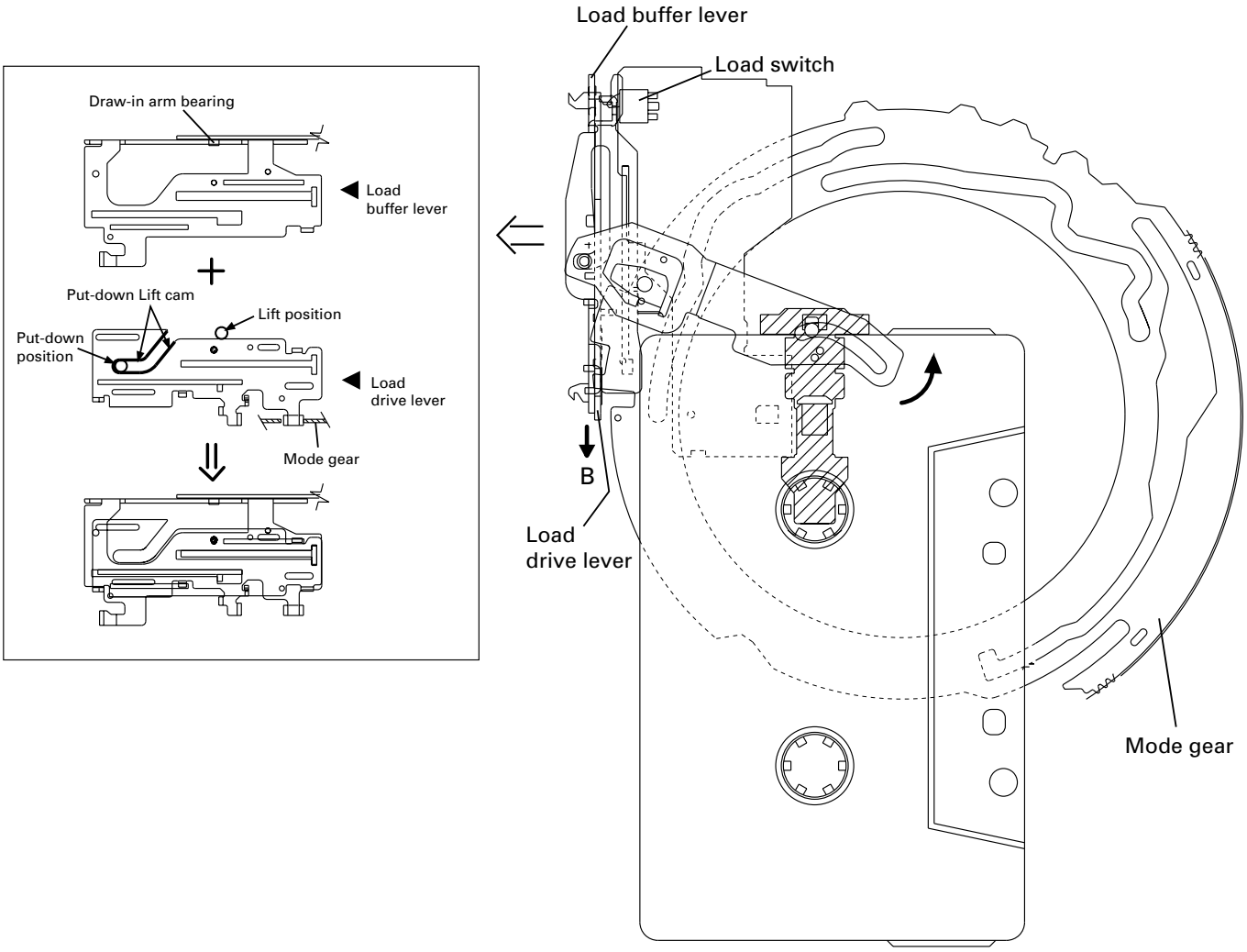
● Loading operation

1. Insert a cassette tape into the slot.
2. The cassette tape pushes the draw-in lever. Then the load switch is turned ON via the draw-in arm and load buffer lever.
3. The sub motor starts running.
4. The sub motor turns the mode gear. Then the mode gear moves the load drive lever and load buffer lever.
5. The shaft holder of the load buffer lever rotates the draw-in arm to draw in the cassette tape.

● Eject operation

1. The cassette tape is ejected in accordance with the reverse of the loading operations. After that, the load switch is turned OFF and the sub motor stops rotating.

1.3 LOADING AND EJECT OPERATIONS(2)



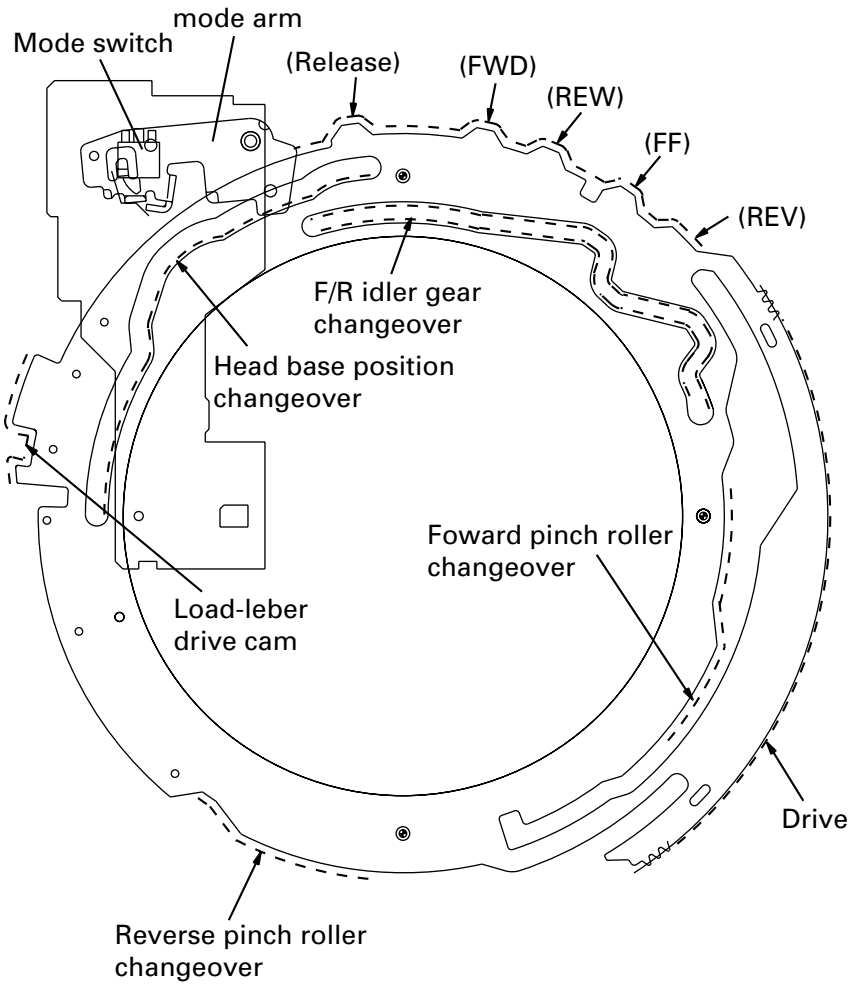
● Loading operation

1. When the mode gear rotates, the load drive lever moves in the direction B marked with an arrow in the figure.
2. As the load buffer lever is linked with the load drive lever via a spring, the load buffer lever turns the draw-in arm in the cassette.

● Eject operation

1. Eject operation is done in accordance with the reverse of the loading operation.

1.4 MODE CHANGEOVER



The mode gear is rotated by rotation of the pre mode gear which is driven by the sub-motor.

The modes are in series in the order of "release"⟷"forward play"⟷"REW"⟷"FF"⟷"reverse play".

The rotation of the mode gear makes changeover of the head position, press contact between the pinch rollers(forward, reverse), the rewinding reel rotation, etc.

The actions to be performed in the separate mode are show in Fig.1 through 5.

● **Release**

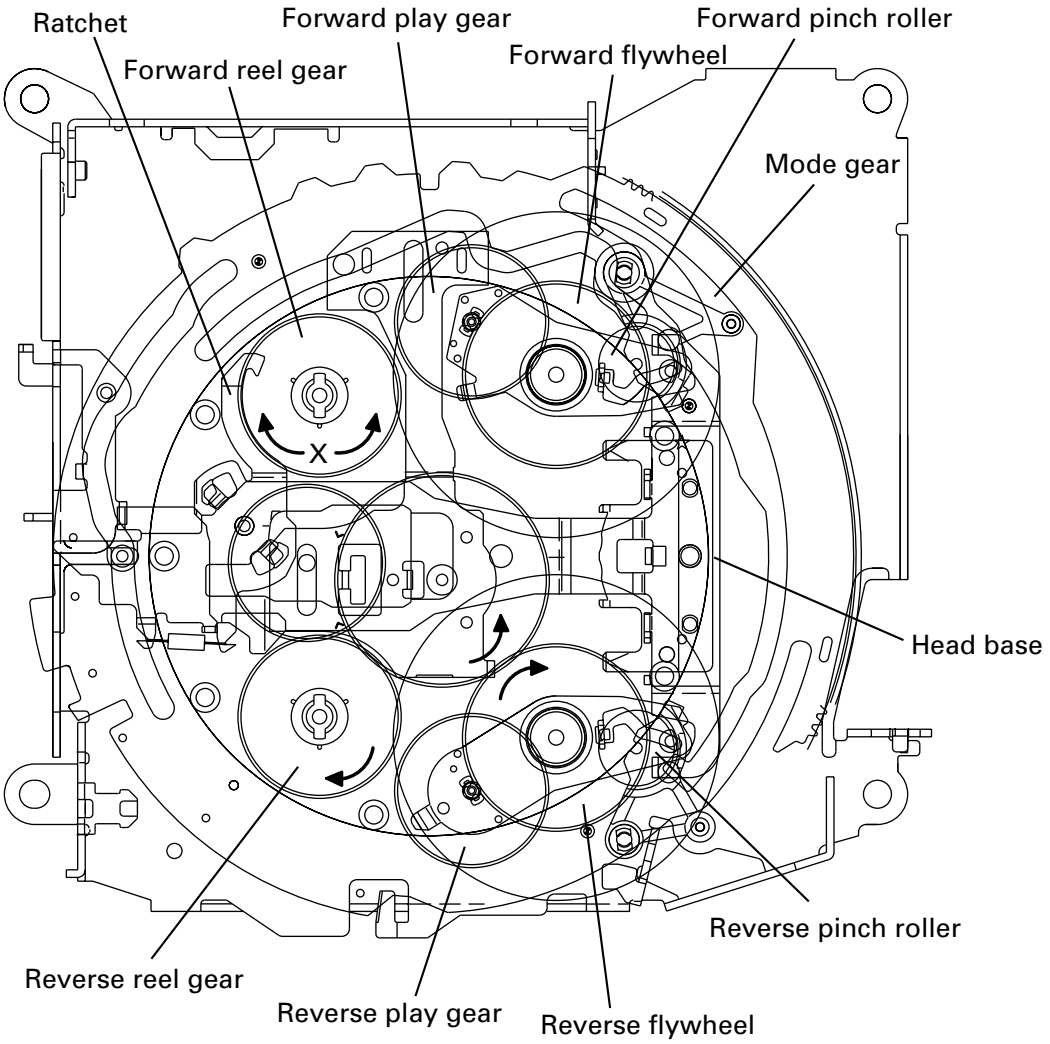


Fig.1

● **Forward Play**

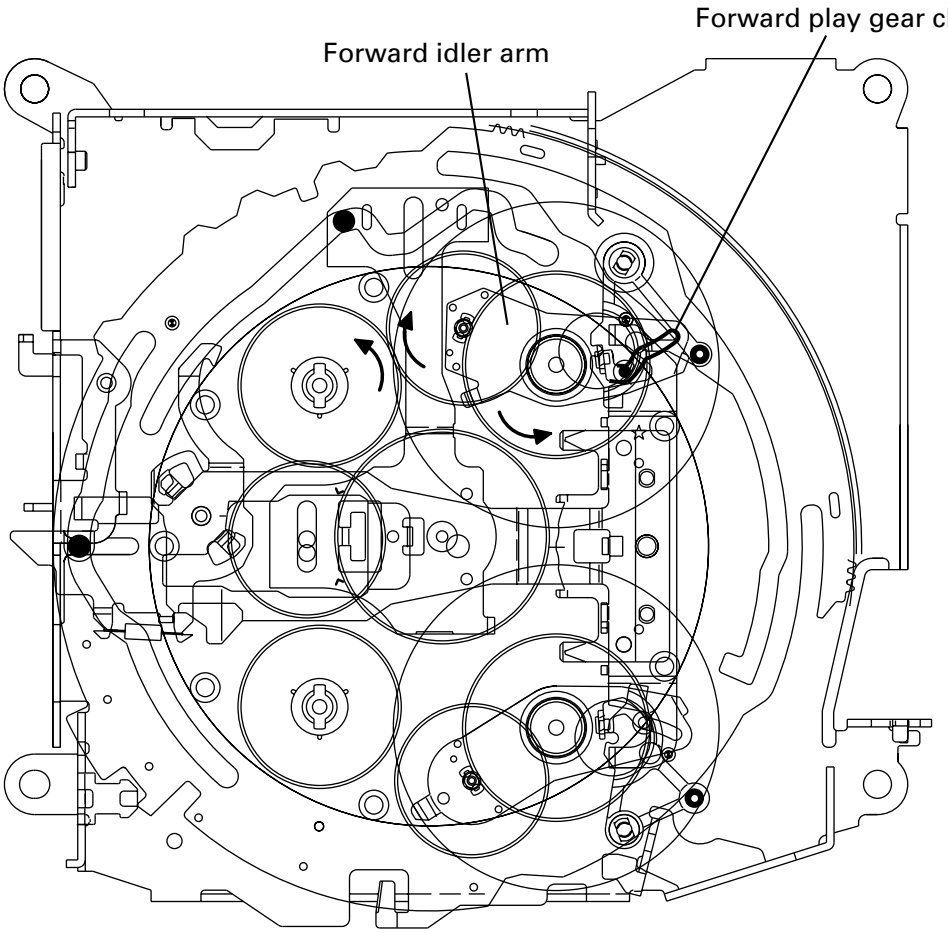


Fig.2

● **REW**

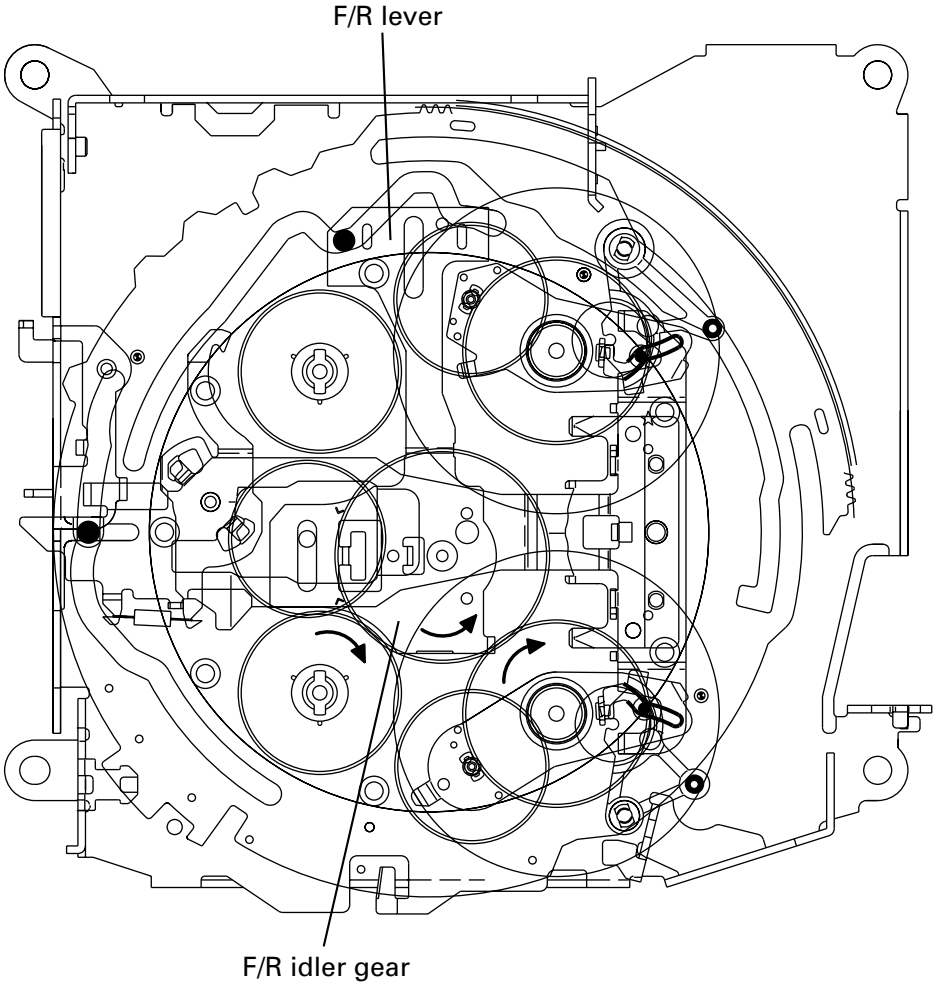


Fig.3

● **FF**

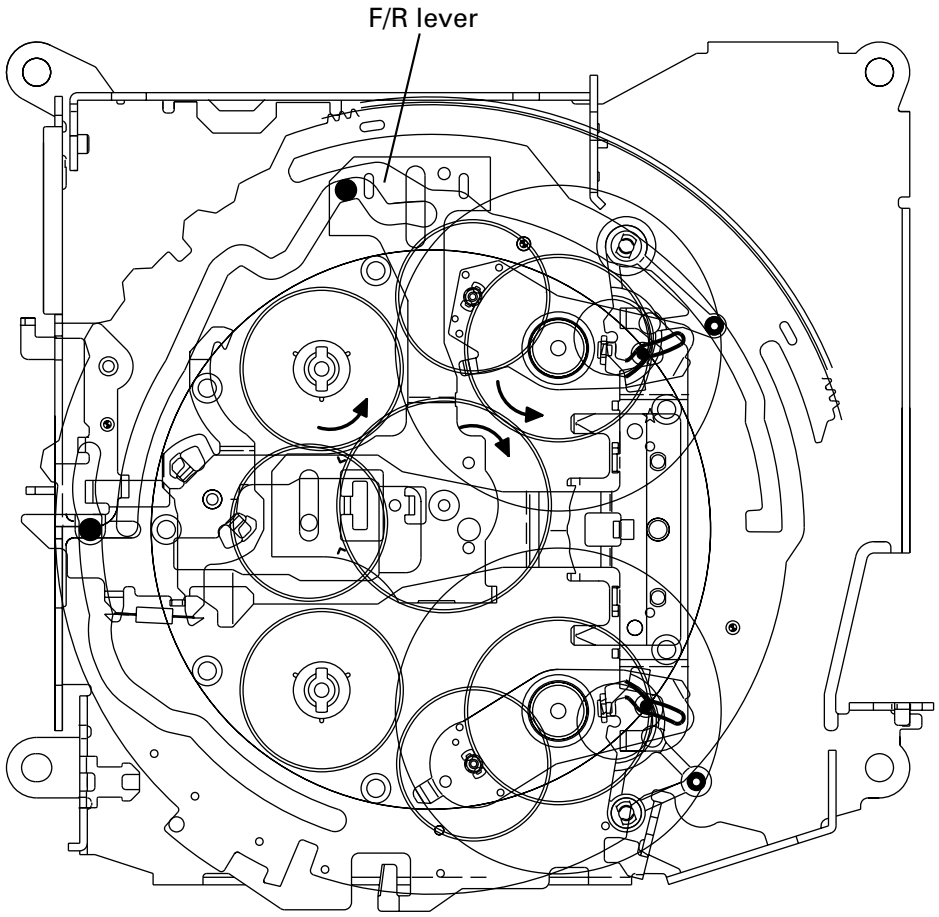


Fig.4

● **Reverse Play**

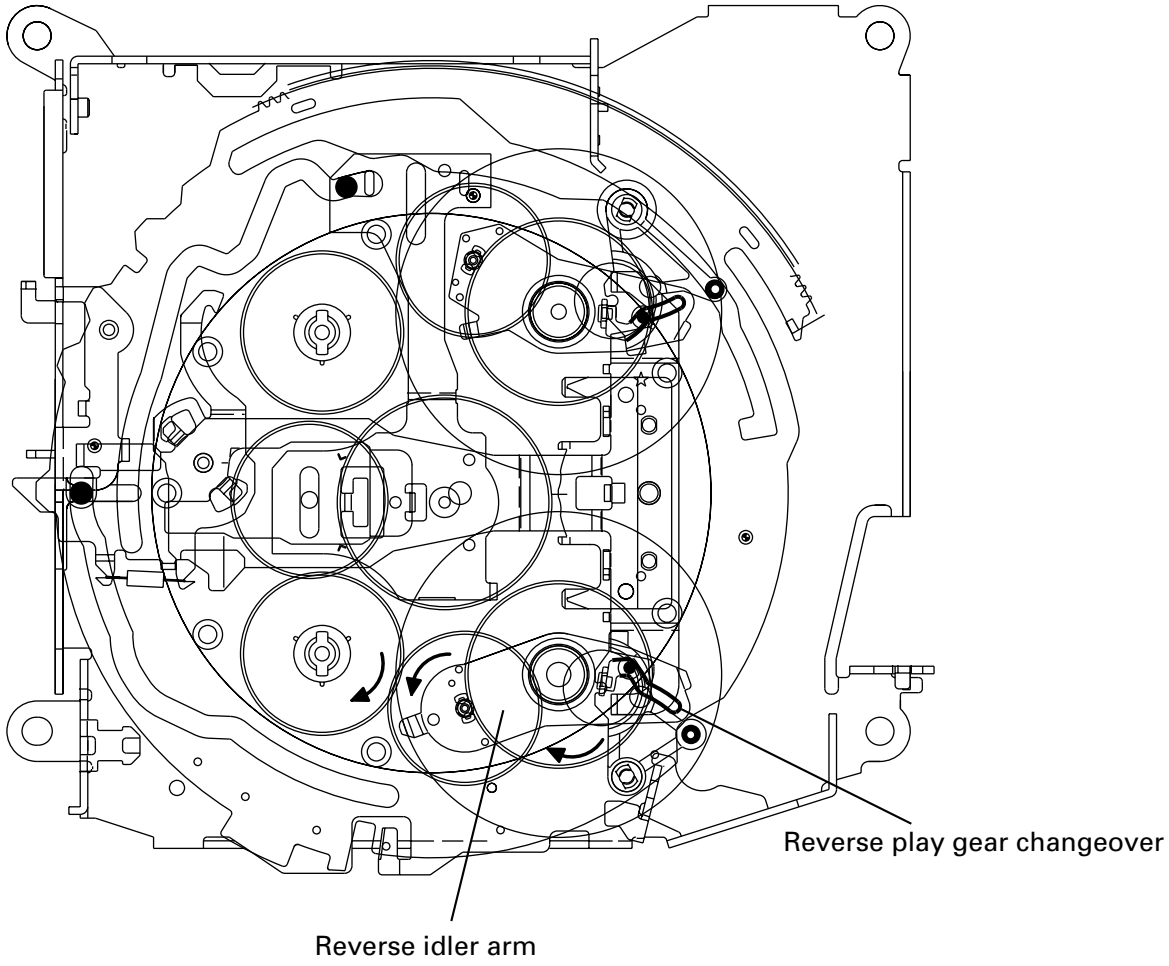
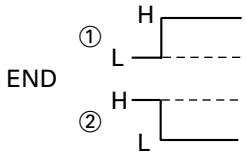
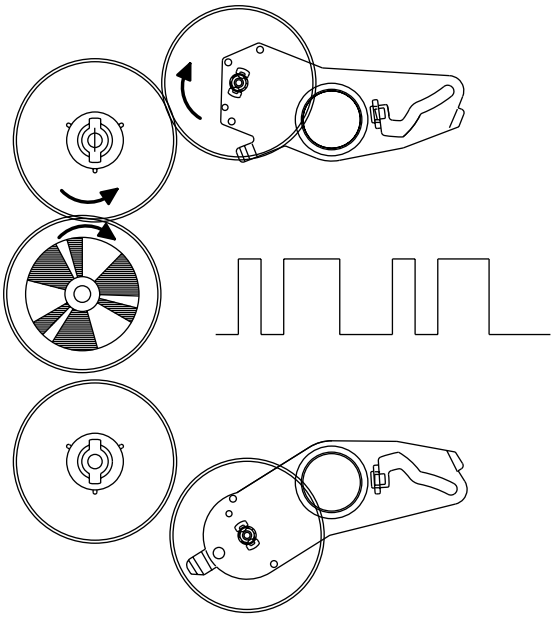


Fig.5

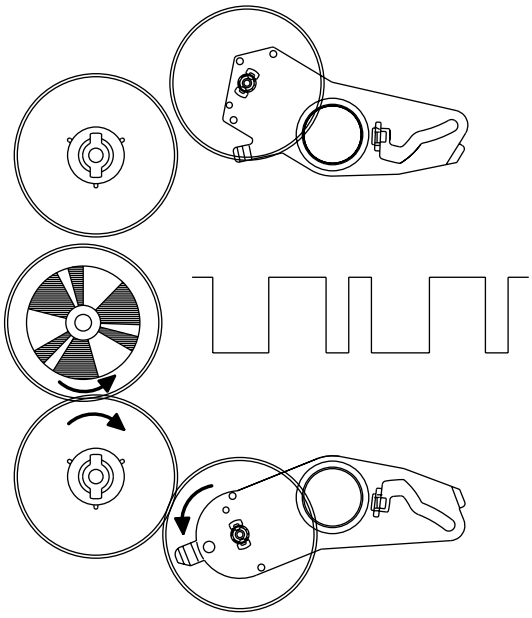
1.5 END SENSE



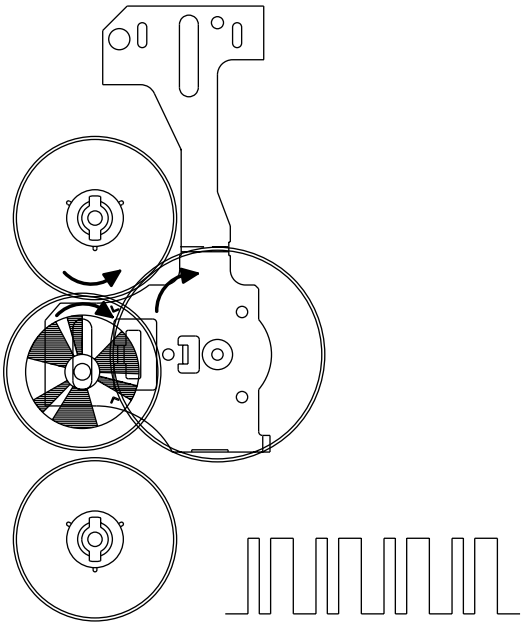
FWD



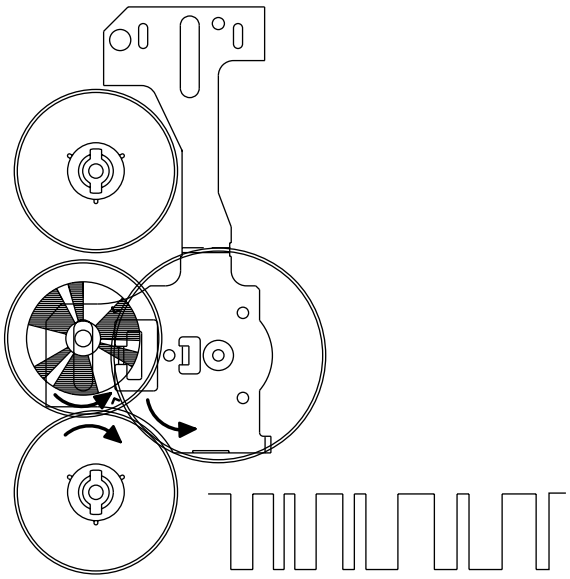
REV



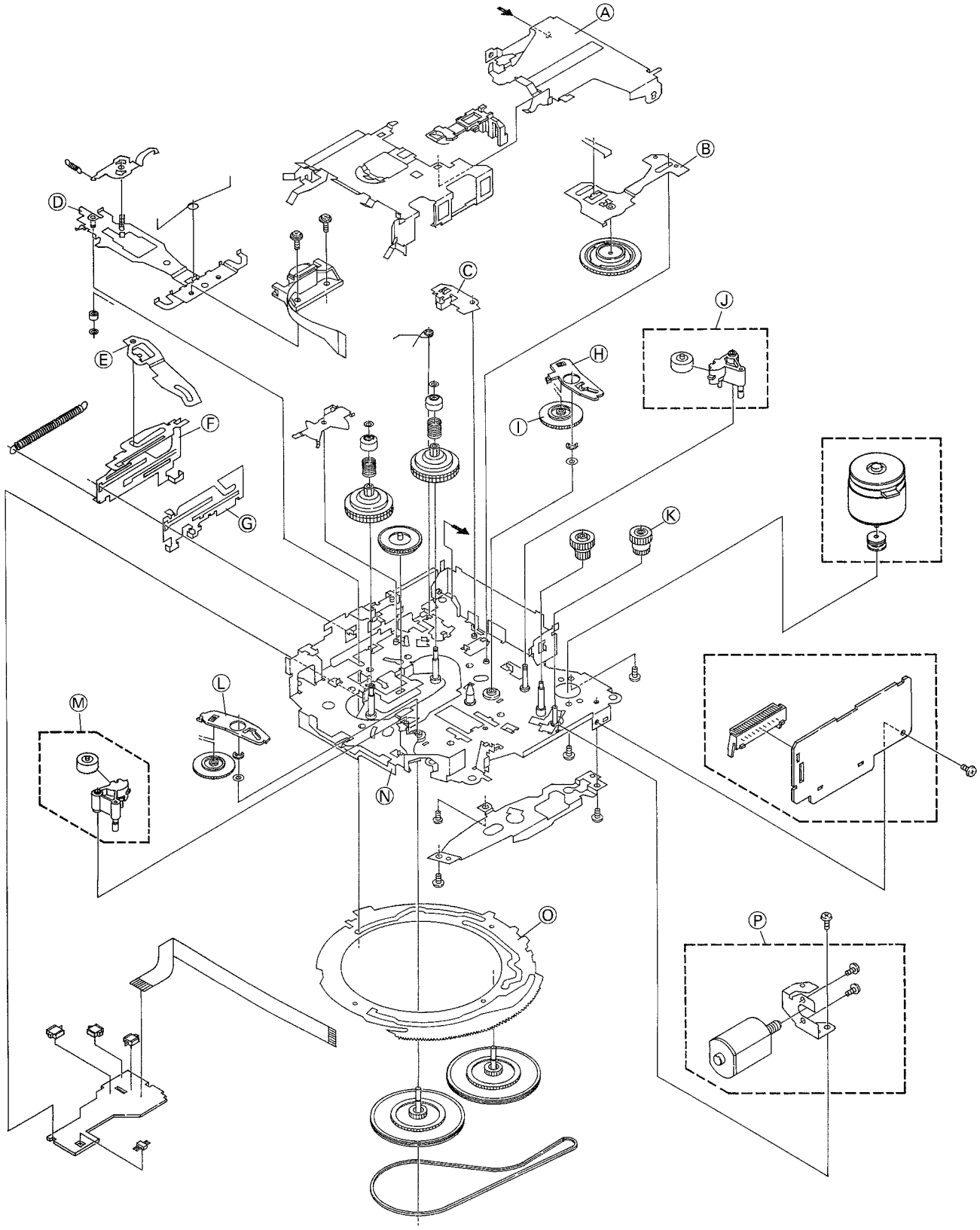
FF



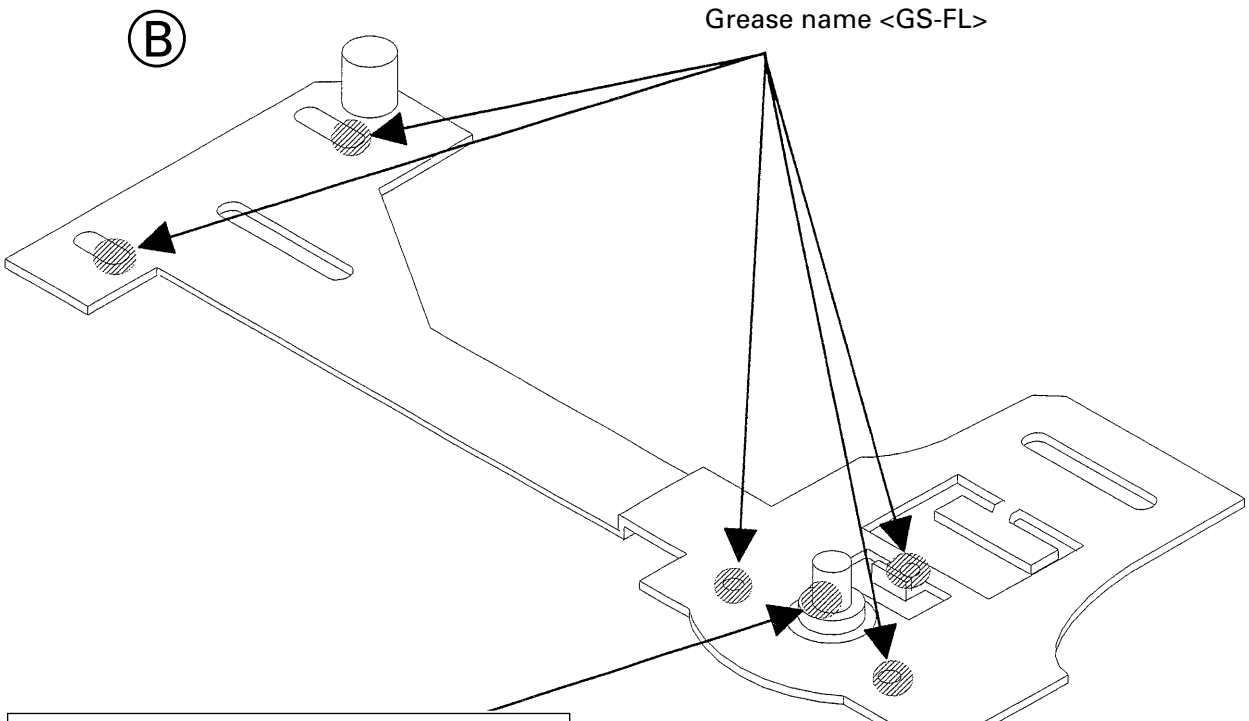
REW



2. GREASE APPLICATION LOCATION AND GREASE NAME

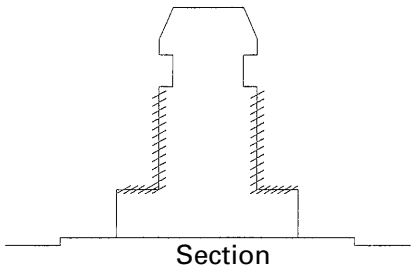


● **F/R Lever 1**



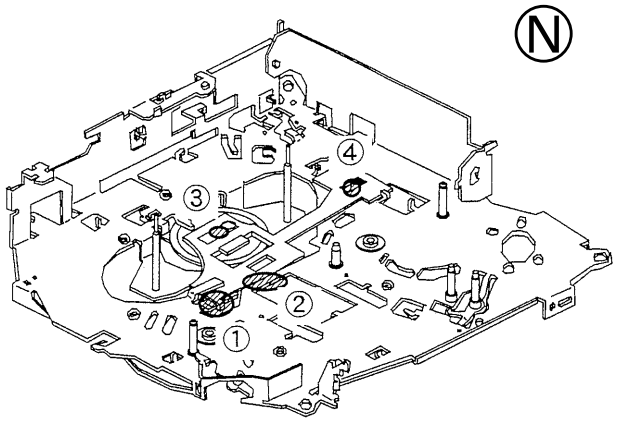
The root of Shaft.

Slant-part as following figure.

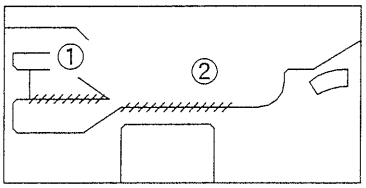


Section

● **Chassis 1 and F/R Lever 2**

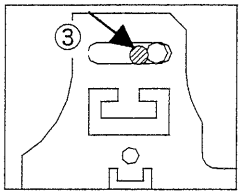


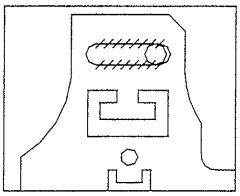
Ⓝ



①② Grease name <GS-FL>
The slant-parts in left figure.
The rubbing part between chassis and F/R lever.

Ⓑ

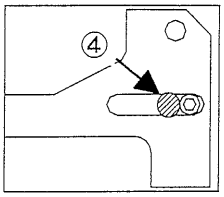


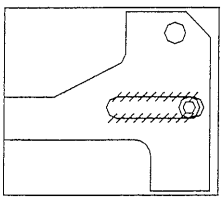


③ Grease name <CS-FL>
The side of shaft (after fix F/R lever).
The slant-parts in left figure.

The rubbing part between F/R lever and shaft.

Ⓑ

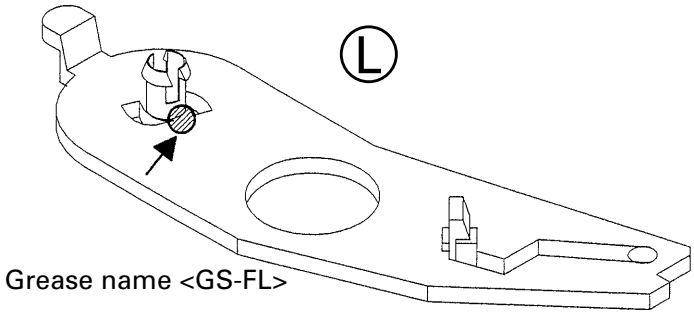




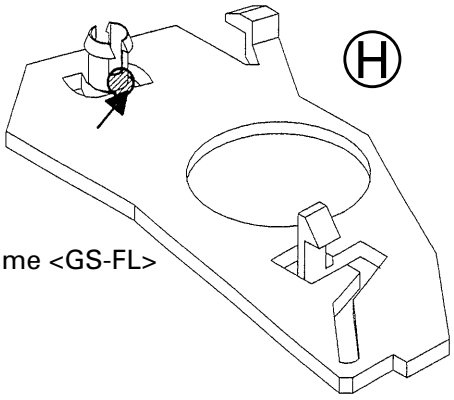
④ Grease name <GS-FL>
The side of bearing (after fix F/R lever).
The slant-parts in left figure.

The rubbing part between F/R lever and bearing.

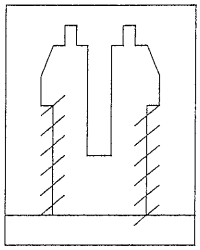
● **Idler arm**



Grease name <GS-FL>



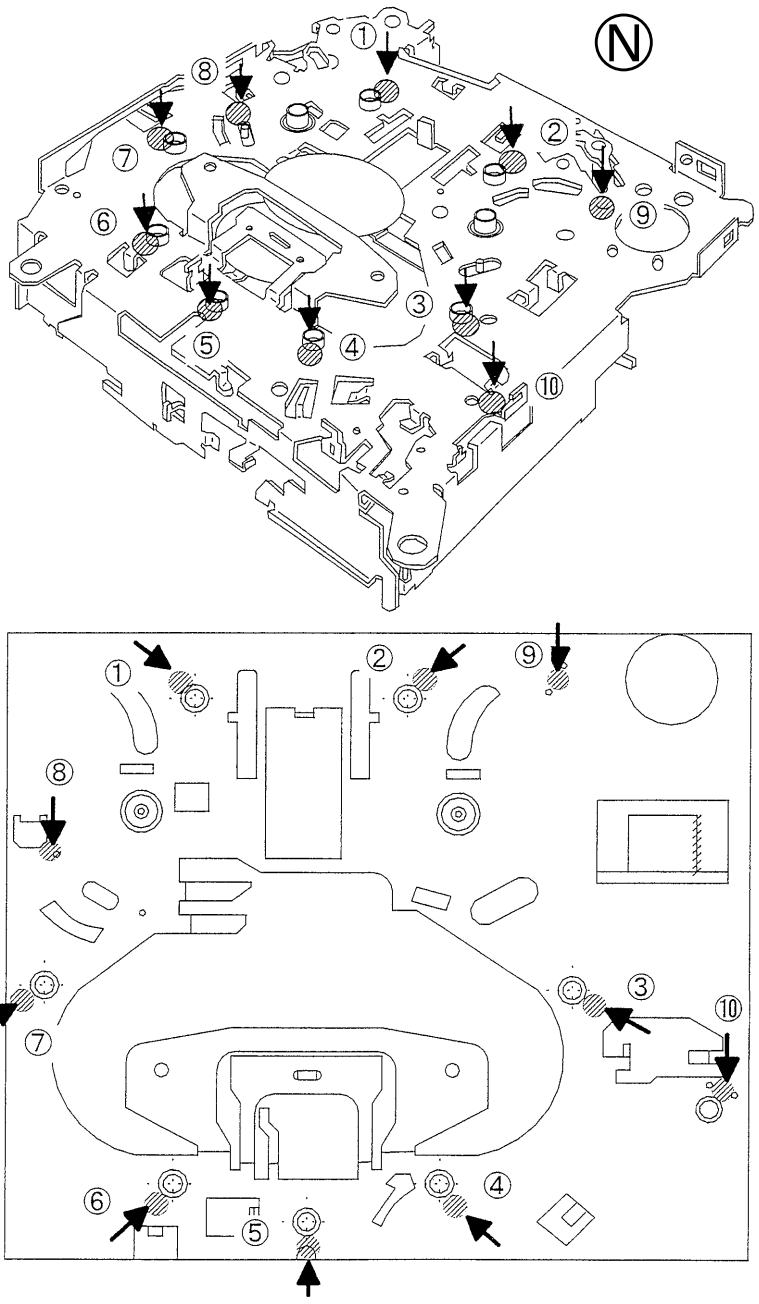
Grease name <GS-FL>



Each the root of boss.

Slant-part in left figure.

● **Chassis 2**



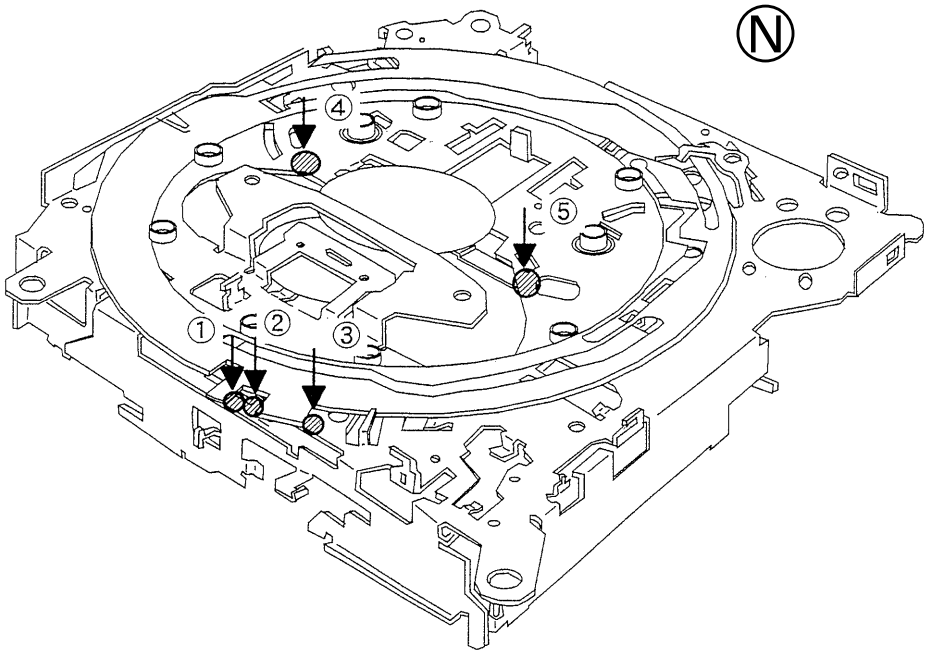
①②③④⑤⑥⑦ Grease name <GS-FLB>
Each the side of bearing.
Rubbing part between bearing and mode gear.

⑧ Grease name <GS-FLB>
The part between carved seal and whole.

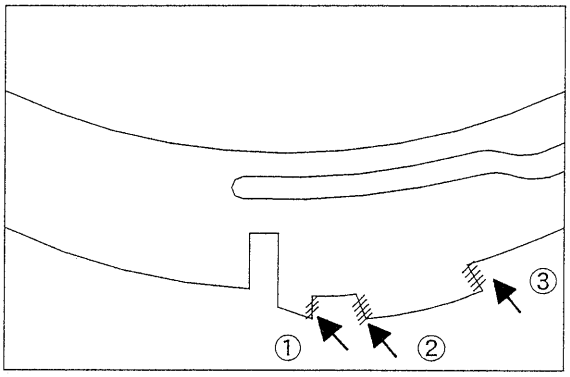
⑨⑩ Grease name <GS-FLB>
Each the part between carved seals.

Chassis and half-pierce of mode gear.

● **Mode gear and Chassis 3**



Ⓞ

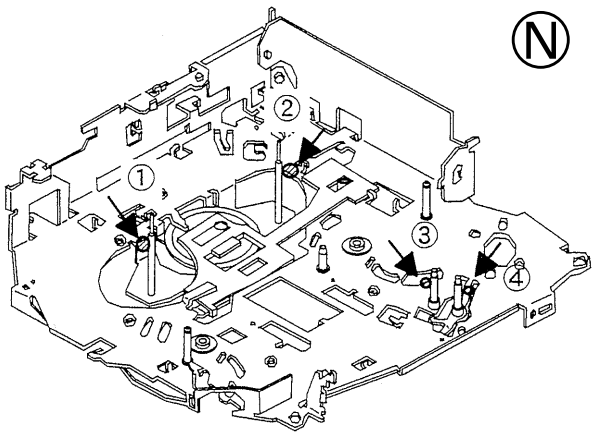


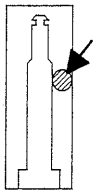
①②③ Grease name <GS-FLB>
Each the edge of cam (mode gear).

Slant-part in left figure.

④⑤ Grease name <GS-FLB>
Each the carved seal.
Rubbing part between chassis and idle gear.

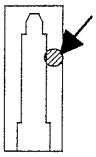
● **Chassis 4**





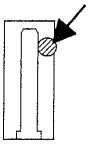
①② Grease name <GS-PG641>
Each the upper side of reel shaft (middle-step).

Slant-part in left figure.



③
The upper side of worm gear shaft.
The side and bottom of worm gear shaft.

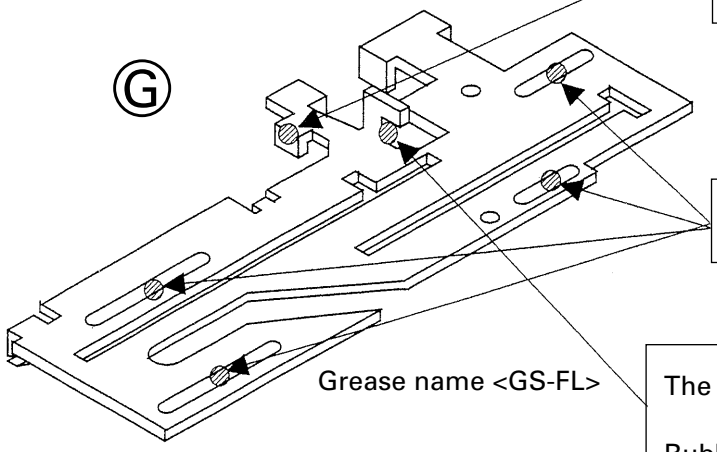
Slant-part in left figure.



④
The upper side of pre mode gear shaft.
The side and bottom of pre mode gear shaft.

Slant-part in left figure.

● **Put-down lever 1**



The bend part.

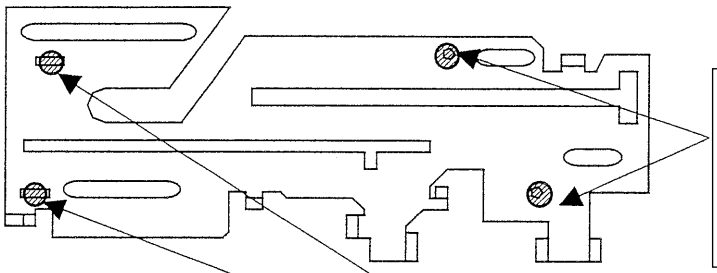
Rubbing part between load lever and HD base.

Each the half-pierce.

Grease name <GS-FL>

The point in left figure.

Rubbing part between load lever and edge (chassis).



Each the half-pierce.

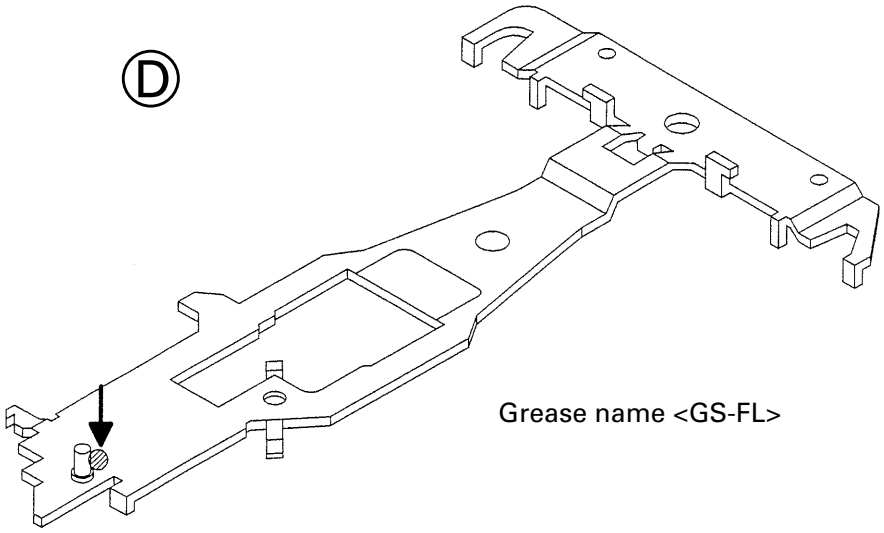
Rubbing part between half-pierce and load buffer lever.

Grease name <GS-FL>

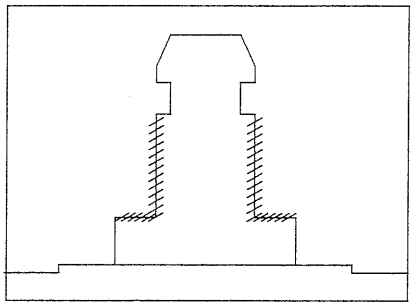
Each the carved seal.

Rubbing part between load lever and half-pierce (load buffer lever).

● **HD base**



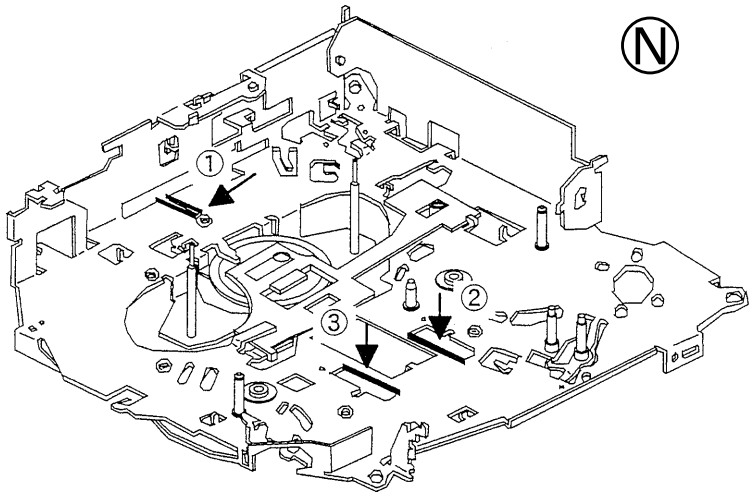
Grease name <GS-FL>

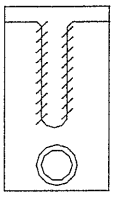


The side of shaft.
The side and bottom of shaft.

Slant-part in left figure.

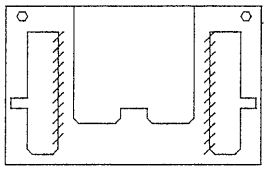
● **Chassis 5**





① Grease name <GS-FL>
The edge of slant-part in left figure.

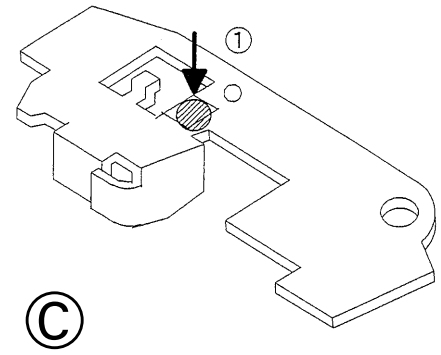
Rubbing between chassis and shaft of HD base.



②③ Grease name <GS-FL>
The edge of slant-part in left figure.

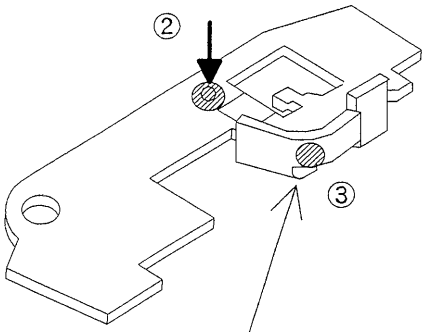
Rubbing between chassis and bend of HD base.

● **Mode arm**

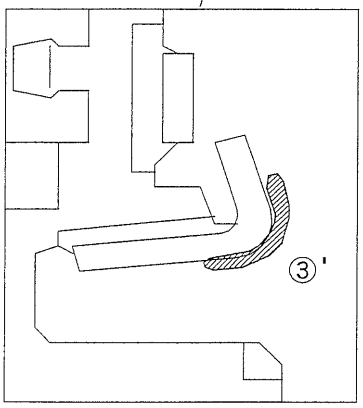


① Grease name <GS-FL>
The part in left figure.

Rubbing between mode arm and spring.



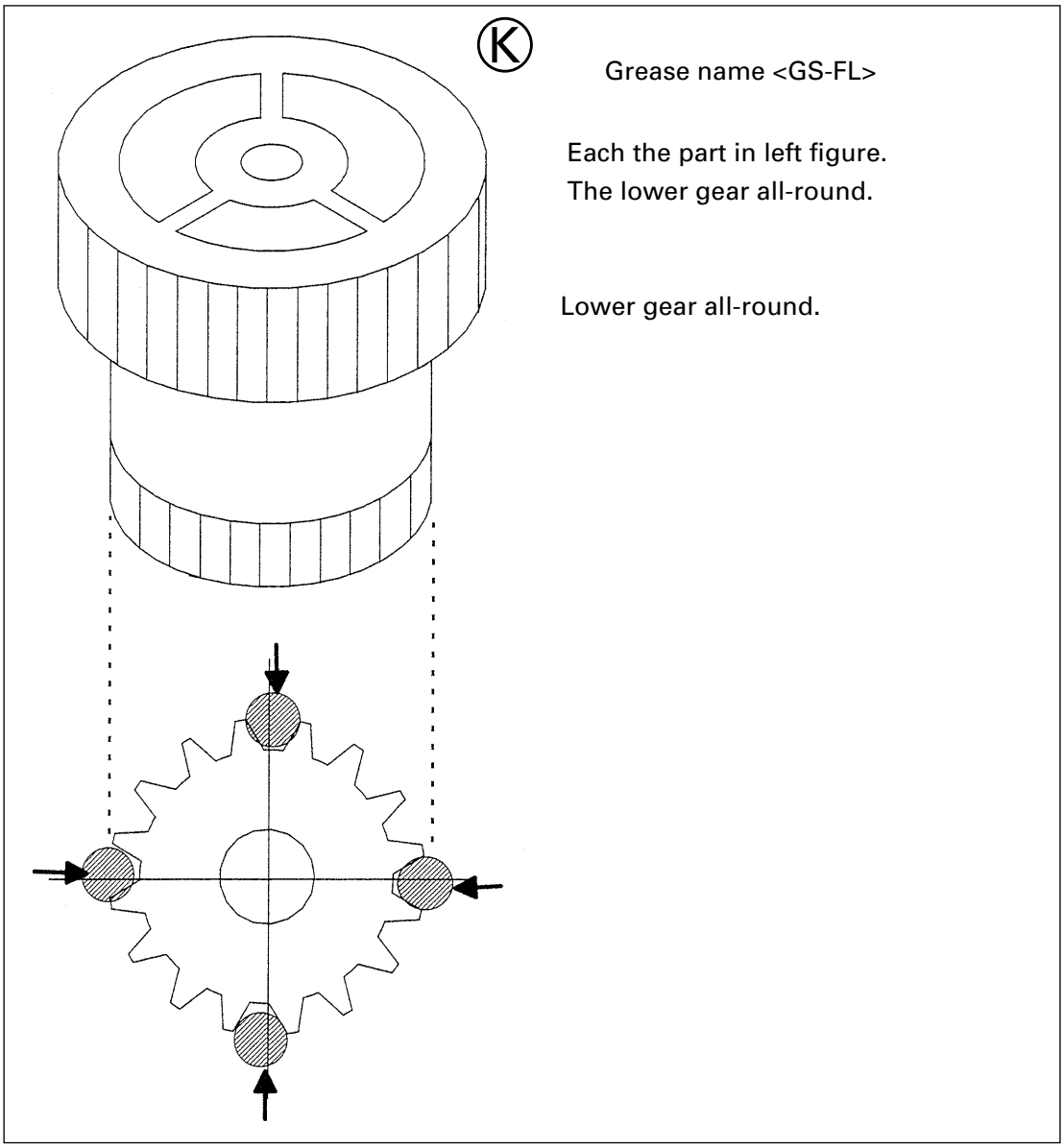
② Grease name <GS-FL>
The half-pierce.



③ Grease name <GS-FL>
The ③-part in left figure.
The ③'-part in left figure.

Rubbing between mode arm and cam (mode gear).

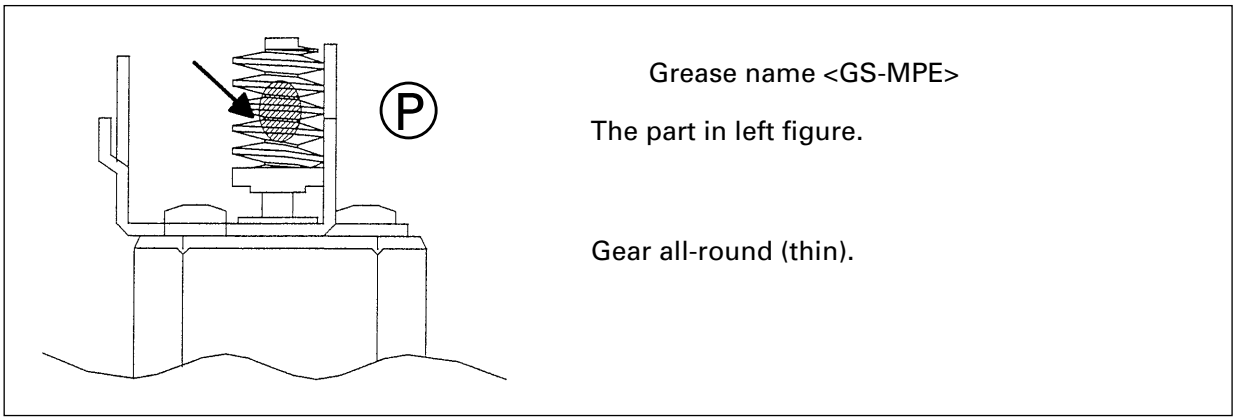
● **Pre mode gear and Worm gear**



Grease name <GS-FL>

Each the part in left figure.
The lower gear all-round.

Lower gear all-round.

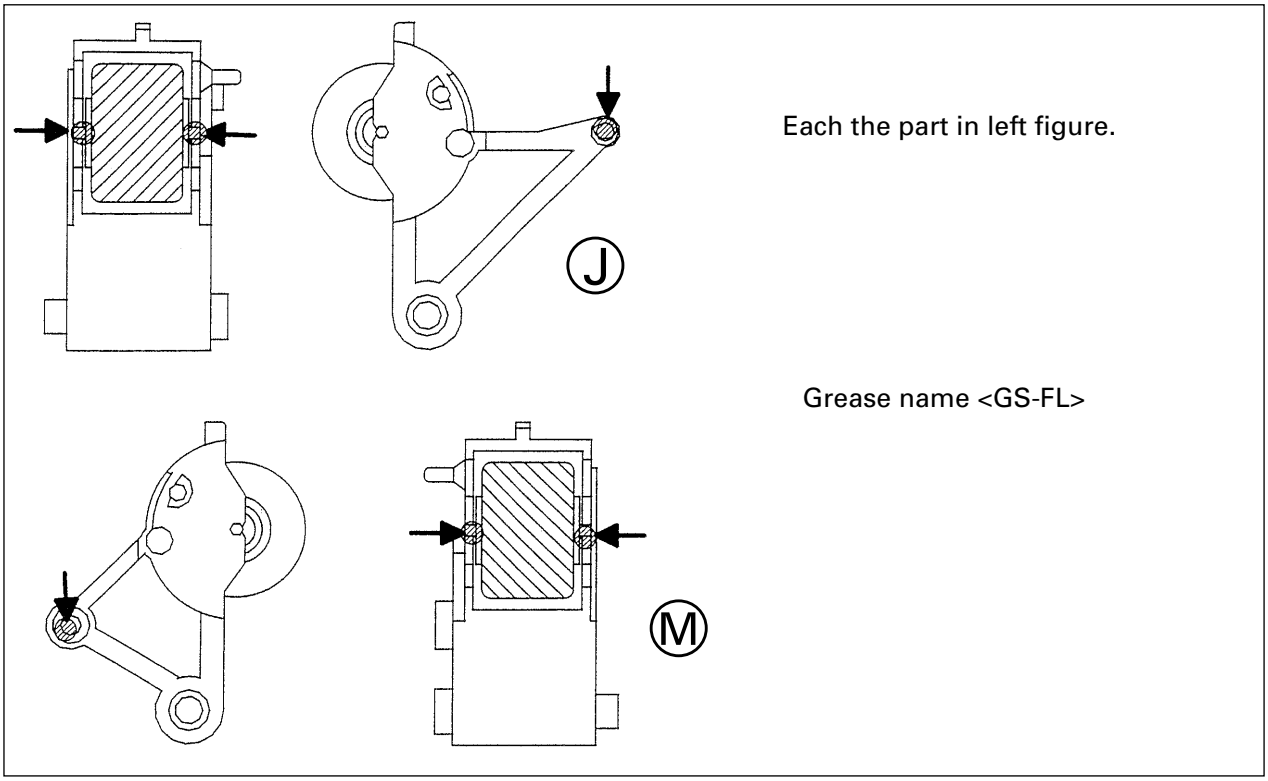


Grease name <GS-MPE>

The part in left figure.

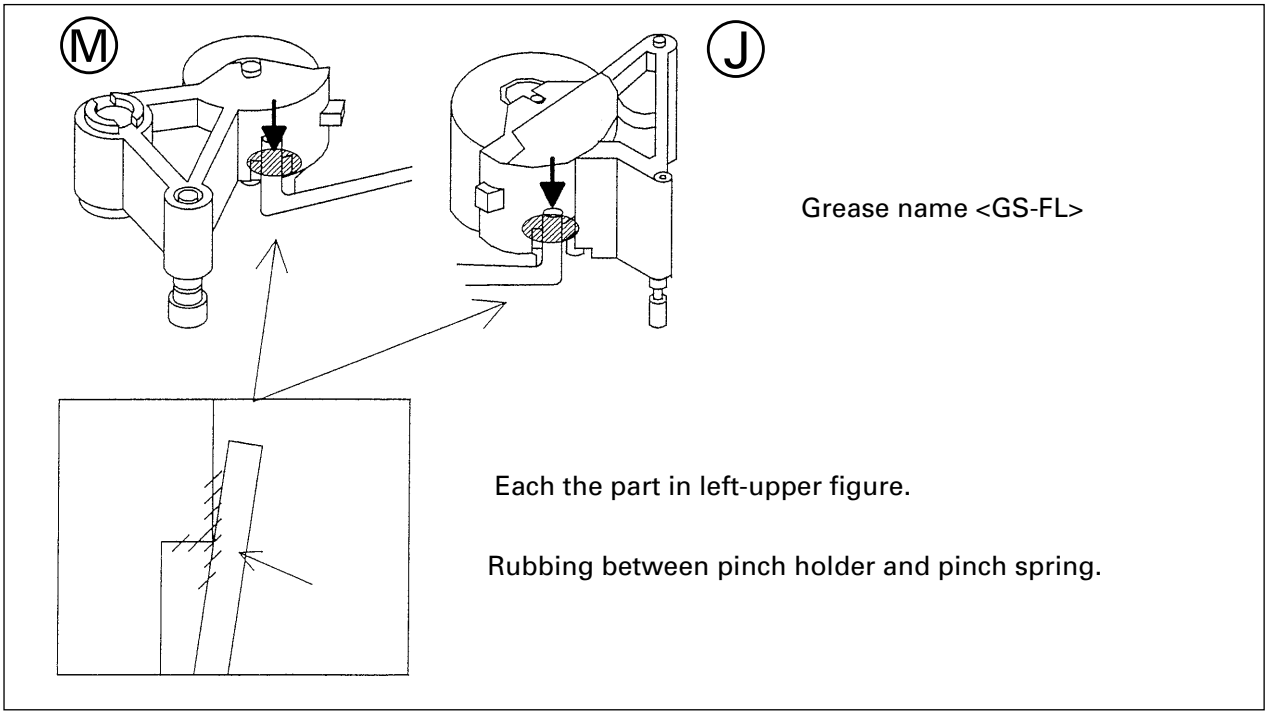
Gear all-round (thin).

● **N/R Pinch holder**



Each the part in left figure.

Grease name <GS-FL>

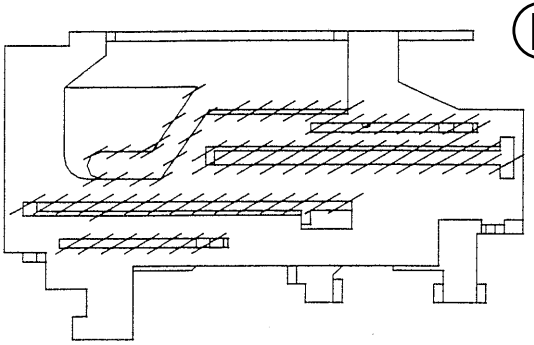


Grease name <GS-FL>

Each the part in left-upper figure.

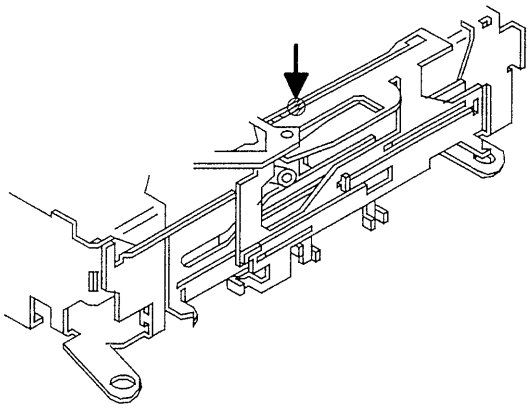
Rubbing between pinch holder and pinch spring.

● **Put-down lever 2 and Put-down buffer lever**



The edge of slant-part in left-upper figure.

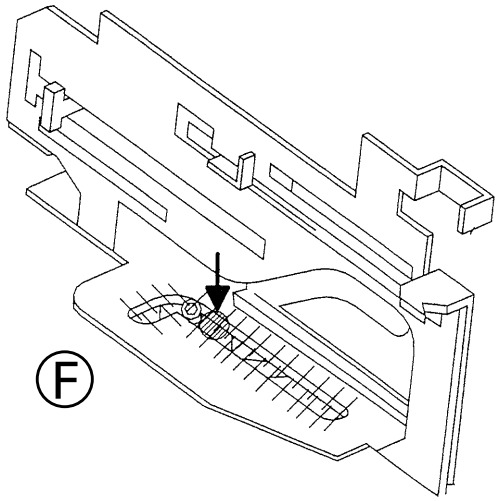
Grease name <GS-FL>



The allow-part in left figure.
The edge of slant-part in left figure.

Rubbing between load buffer lever and bend (chassis).

Grease name <GS-FL>

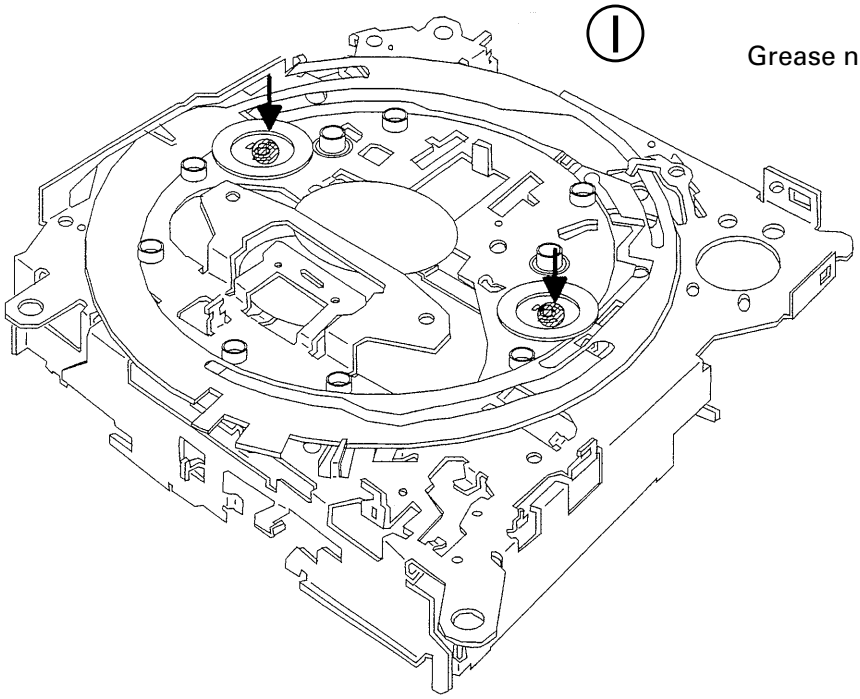


The allow-part in left figure.
(after fix load buffer lever).
The edge of slant-part in left figure.

Rubbing between load buffer lever and bearing (draw-in arm).

Grease name <GS-FL>

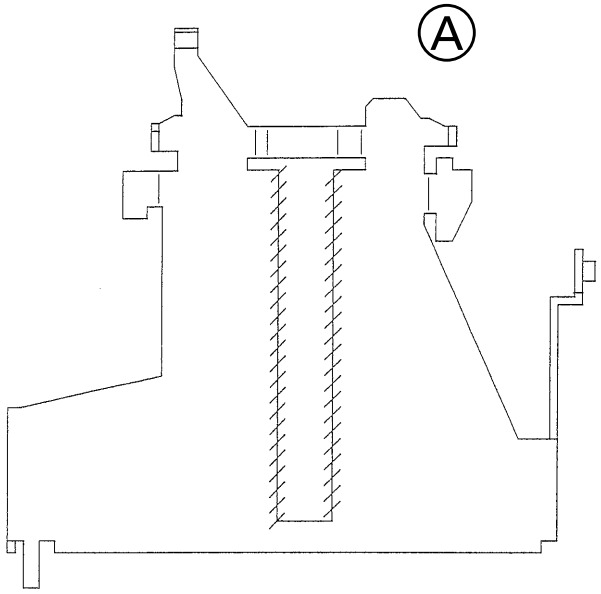
● **Idle gear**



Grease name <GS-FL>

The allow-part in upper figure. Rubbing between between idler gear and idler arm.

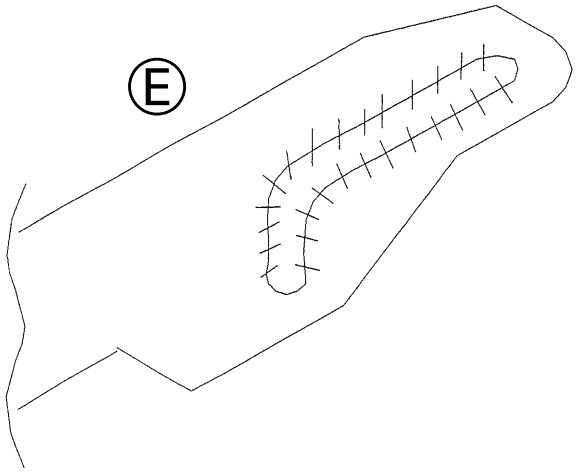
● **Cassette frame and Draw-in arm**



The slant-part in left figure (Thin).

Rubbing between cassette frame and draw-in lever.

Grease name <GS-FL>



The slant-part in left figure.

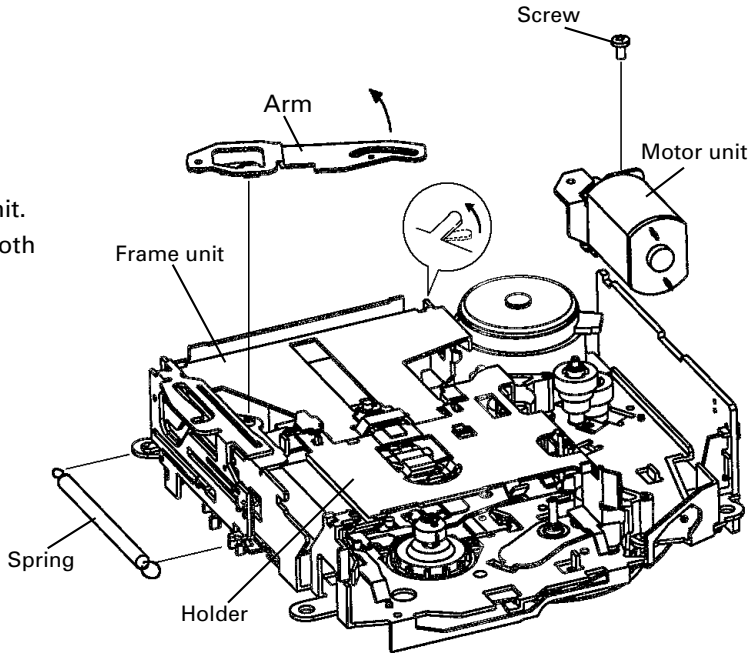
Rubbing between draw-in arm and draw-in lever.

Grease name <GS-FL>

3. DISASSEMBLY

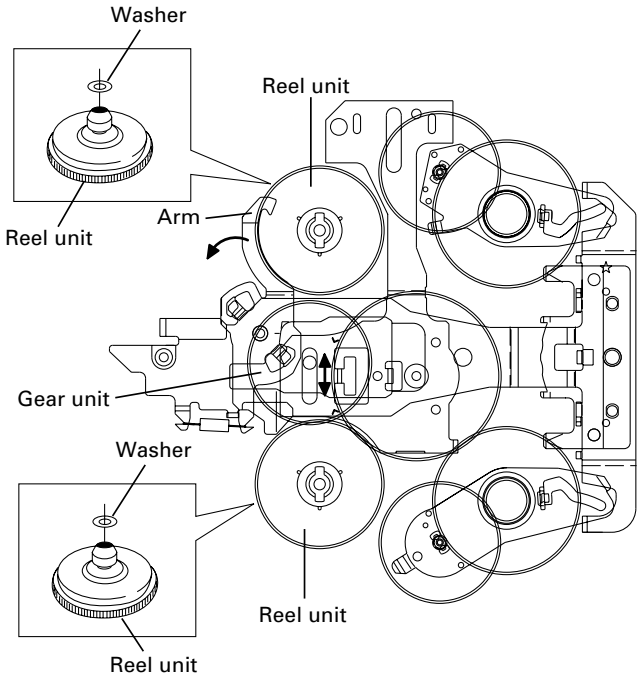
● Remove the Cassette holder

1. Remove the spring and the arm.
2. Remove the screw, and then remove the motor unit.
3. Straighten the frame unit pawl, and remove both holder and frame unit.



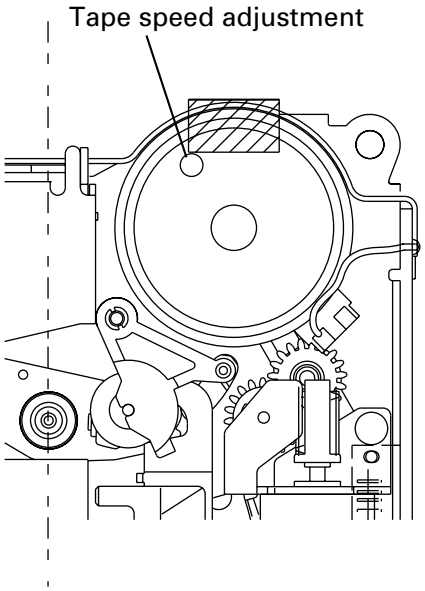
● Remove the Reel Unit

1. Remove the washer.
2. Slide the gear unit to separate it from the reel unit.
3. Push the arm in the direction marked with an arrow, and remove the reel unit.



4. ADJUSTMENT

4.1 TAPE SPEED ADJUSTMENT



● **Adjustment method**

1. Load the test tape NCT-111 (3kHz, -10dB)and play.
2. Adjust the semi-fixed resistor so that frequency counter shows 3015Hz(+75Hz, –45Hz).

4.2 CHECK POINTS OF CASSETTE MECHANISM

Confirm the following items when replacing parts of the cassette mechanism .	● Tape speed deviation: 3,000Hz +90Hz, –30Hz (4.76cm/s +3%, –1%) Using an NCT-111, measure the speed at the start and end of winding and take the maximum values.If values indicated by the pointer vary considerably, adjust to 70% of the minimum and maximum values. Measuring time shall be 5–6 seconds.	● Wow and flutter: Less than 0.15%(WRMS) Using the NCT-111, measure the wow and flutter at the start and end of winding and take the maximum value. If values indicated by the pointer very considerably, adjust to 70 % of the minimum and maximum values. Measuring time shall be 5–6 seconds.
● Fast forward and rewinding time: 85–105 seconds Using a C-60, set to fast forward and rewind, and measure the time with a stop watch.	● Winding torque: 45–70 g•cm (4.41–6.86mN•m) Using a cassette type torque meter (100 g•cm), measure the minimum value while in the play mode. Measuring time shall be 5–6 seconds.	● F.F. torque: More than 50 g•cm (4.9mN•m more) Using a cassette type torque meter (130 g•cm), measure the value when the tape stops in the F.F. mode.
● REW torque: More than 50 g•cm (4.9mN•m more) Using a cassette type torque meter (130 g•cm), measure the value when the tape stops in the REW mode.	● Back tension torque: 1.5–5.5 g•cm (0.15–0.54mN•m) After setting the REW mode without loading a cassette tape for 5 minutes, measure the back tension torque in the play mode, using a cassette type torque meter.	